



2025

Forest Health Highlights in Washington

A summary of insect, disease, and other disturbance conditions affecting Washington's forests





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Right: Western spruce budworm defoliation in the North Cascades in 2025. Rachel Brooks / DNR

Top left: Douglas-fir needle midge. Dana Brennan / DNR

Center left: Mountain pine beetle gallery. Glenn Kohler / DNR

Bottom left: Douglas-fir tussock moth larva. Dana Brennan / DNR

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disease, and other
disturbance conditions
affecting Washington's
forests

Washington State Department
of Natural Resources (DNR)
Forest Resilience Division
May 2026



WASHINGTON STATE DEPT OF
**NATURAL
RESOURCES**





Summary

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his report summarizes insect, disease, and other disturbance conditions impacting Washington's forests in 2025 by compiling information from the annual Insect and Disease Aerial Detection Survey (ADS), ground monitoring, and field observations.

In 2025, ADS surveyors flew approximately 16.5 million forested acres across Washington. This accounts for about 75% of the 22 million forested acres in Washington usually covered by this survey. Challenges posed throughout the 2025 survey season due to aircraft availability, federal staff vacancies, and adverse weather meant the survey could not be completed as planned. Since 1947, the Washington State Department of Natural Resources (DNR), the USDA Forest Service (USFS), and Oregon Department of Forestry have coordinated the ADS to observe recently killed and currently damaged forest trees. Information about location, likely cause, and size of forest disturbances collected during the ADS helps land managers across the state make appropriate management decisions. Continued interagency cooperation is essential for completing the annual survey each year.

- **In 2025, the statewide insect and disease survey recorded some level of tree mortality, tree defoliation, crown damage, or foliar disease on approximately 391,000 acres.** The area with damage from mortality agents was roughly 214,000 acres, including 141,000 acres attributed to bark beetles and 57,000 acres mapped as young conifer mortality (primarily bear damage or root disease). Approximately 173,000 acres contained damage attributed to defoliators, while 4,000 acres were attributed to tree diseases or other damage causes. This is likely an undercount due to the reduced acreage surveyed. Previous annual totals for all damage agents were:

ADS ACREAGE Table 1.

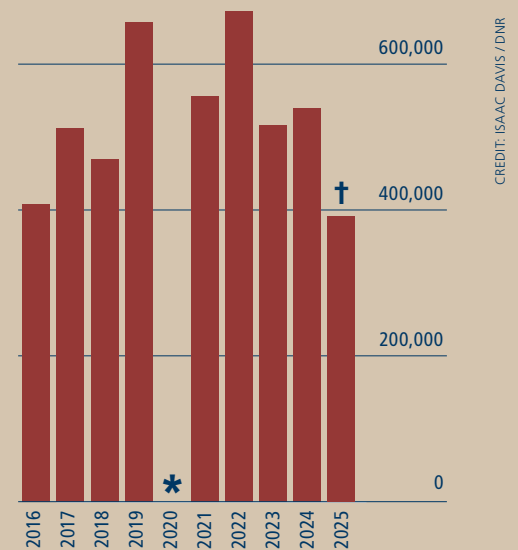
Year, acres with damage, and acres surveyed during the past 5-years.

YEAR	ACRES WITH DAMAGE	ACRES SURVEYED
2025	391,000	~ 16.5 million
2024	545,000	~ 22 million
2023	517,000	~ 22 million
2022	672,000	~ 22 million
2021	555,000	~ 19 million

CREDIT: RACHEL BROOKS / DNR



Western spruce budworm adult and associated damage in the North Cascades



CREDIT: ISAAC DAVIS / DNR

Figure 1.

TOTAL ACRES WITH INSECT AND DISEASE DAMAGE, 2016-2025

Recorded during annual aerial detection surveys

* Trend data are not available for 2020 due to changes in survey methods and reduced survey area

† Only 75% of the annual aerial detection survey was completed in 2025 due to challenges with federal staff vacancies, aircraft availability, and adverse weather



- **Washington experienced above-average temperatures for the majority of 2025**, including the warmest September on record and the second warmest yearly statewide average temperature ever measured. **All lands were subject to drought conditions throughout the summer** before fall and winter rains improved or removed most of the state's drought conditions. This included December's back-to-back atmospheric river event that resulted in record river levels, catastrophic flooding, and widespread landslides in western Washington. This early-winter rain eroded snowpack at mid-elevations and contributed to the development of a snow drought. Non-normal weather conditions can increase tree stress and pest and pathogen success.

- **Large fires burned 183,000 acres statewide, of which about 60% were forested.** DNR and partner agencies maintained strong preparedness and rapid response performance, containing 94 percent of fires under 10 acres and preventing major community losses with no civilian or firefighter fatalities occurring.

- **Mountain pine beetles remains active.** Mountain pine beetle damage decreased from 83,600 acres in 2024 to approximately 29,000 acres in 2025. Some of this decrease is likely due to a reduction in the acres surveyed. The majority of pine bark beetle mortality is in lodgepole pine killed by mountain pine beetle, which totaled 24,700 acres.

- **Western pine beetles remains active.** Acres with ponderosa pine mortality due to western pine beetle was approximately 19,200 acres in 2025, down from the 32,800 acres mapped in 2024 and below the 10-year average of 27,200 acres. Some of this decrease is likely due to a reduction in the acres surveyed. Recent drought conditions have driven a steady increase in western pine beetle damage since 2012, reaching a peak of approximately 44,300 acres in 2022, the highest level recorded since 2006. Concentrations of mortality were widespread throughout lower elevation forested areas of eastern Washington, but damage was especially severe in Klickitat County and western Yakima County.

- **Fir engraver damage decreased but remains elevated.** Fir engraver damage has been increasing since 2015 and reached a 10-year high of 166,300 acres in 2019. Following a drop to 52,500 acres in 2021, the upward trend resumed with an increase in 2023 to 99,000 acres. In 2025, the number of acres

affected decreased to approximately 51,000 acres, below the 10-year average of 73,700 acres. Some of this decrease is likely due to a reduction in the acres surveyed in 2025.

- **Outbreaks of western spruce budworm defoliation continued for the second year in the North Cascades, from the Mt. Baker area in central Whatcom County east into Okanogan and Chelan counties, affecting approximately 149,200 acres in 2025.** Outbreaks of this native defoliator are not unusual in Washington. This outbreak is currently smaller than the last significant western spruce budworm outbreak in 2011 and 2012, which impacted more than 500,000 acres in the central Washington Cascades.

- **Monitoring of Douglas-fir tussock moth (DFTM) populations in eastern Washington using pheromone traps and ground observations indicates new outbreaks and defoliation damage are likely to occur beginning in 2026 or 2027.** Outbreaks of this native defoliator are not unusual in Washington. Rates of trap catches are elevated in Okanogan, Kittitas, Yakima, and Klickitat counties; trap locations cannot be used to accurately predict where future defoliation may occur. DFTM larvae and egg masses were recently observed in Klickitat and Lincoln counties. The last DFTM outbreak occurred in 2018 and 2019 in Kittitas and Chelan counties.

- **Douglas-fir needle midge caused defoliation in northeastern Washington.** The larvae of this native fly feeds in current year Douglas-fir needles resulting in discoloration and distortion of affected needles. Several consecutive years of defoliation can result in twig dieback and reduced tree vigor.

Outbreaks of western spruce budworm defoliation in the North Cascades continued for the second year



Aerial Detection Survey

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he Insect and Disease Aerial Detection Survey (ADS) is a cornerstone of a national monitoring strategy designed to evaluate the health of forestlands across the contiguous United States, Alaska, and

Hawaii. In Washington, this program operates as a longstanding, collaborative effort between the US Forest Service (USFS) and the Washington State Department of Natural Resources (DNR). Under this cooperative agreement, both agencies traditionally share the responsibility of documenting tree mortality and decline throughout the state, ensuring that critical findings are reported to a broad network of federal, state, tribal, and private cooperators. By maintaining this partnership, the program provides a comprehensive "bird's-eye view" of the landscape impossible to achieve through ground-based observation alone.

The utility of ADS data extends beyond the simple tracking of endemic and invasive insect outbreaks or foliar diseases. These data serve as a vital resource for monitoring long-term environmental trends and advancing scientific research in forest resilience. Survey results are instrumental for communicating wildfire risk to local communities by identifying areas of concentrated fuel loads and standing dead timber. By providing insights into the state of the forest, ADS helps guide contemporary management practices and allows land managers to make data-driven decisions that protect both natural resources and public safety.

To ensure the highest degree of accuracy, the survey is conducted annually between the months of June and September. This specific window is chosen because it aligns with the period when forest damage – such as red crown discoloration caused by bark beetles or thinning crowns resulting from defoliators – is most visually distinct and easily identified from the air by trained observers. The ADS program provides an essential, timely record that remains foundational to the protection and management of Washington's forest ecosystems.

The 2025 survey season was defined by a period of unprecedented structural change and administrative challenges. USDA Region 6 Forest Service personnel changes occurred mid-season including the loss of permanent, dedicated, full-time ADS staff coordinators and data analysts. Therefore, program leadership for Washington's ADS transitioned to DNR with reduced capacity. Additionally, in August, the Washington Department of Fish and Wildlife (WDFW) terminated its pilot position and retired their Partenavia P68 aircraft, which had served as the program's primary survey platform for over a decade.

Despite these significant personnel and logistical headwinds, the Washington ADS team executed a responsive and strategic mid-season pivot to DNR-led operations that successfully surveyed 16.5 million acres (75%) of the state's forests. While this marked the first year since 2021 that a full survey was not completed, the strategic prioritization of high-value, dynamic forestlands ensured that vital forest health data remain available for much of the state while prioritizing safety and sustainability of the staff and program.

Safe stabilization of aircraft resources and personnel is a continued administrative priority for the upcoming survey season. The loss of the WDFW aviation unit necessitates a shift toward more costly private vendors and DNR's specialized wildfire aviation resources. While these platforms offer the high-performance capabilities required for complex aerial surveys, they could result in a significant increase in the annual operational budget. Loss of experienced USFS staff, increased pilot training time, and expanded DNR administrative burdens will significantly affect the program's ability to survey the entire state in future seasons. Securing long-term, consistent federal funding and reinstating USFS aerial survey personnel are necessary to offset these rising costs. Without a renewed commitment to the traditional cost-sharing balance, the program faces significant financial uncertainty that could impact the scope and frequency of future forest health monitoring in Washington.

The long-term continuity of the Washington ADS program is anchored by a commitment to specialized training and internal leadership. DNR's full-time aerial observer, Isaac Davis, recently completed his fourth year as a Fixed-Wing Flight Manager and took on critical program management duties following federal vacancies. Justin Hof, USFS aerial survey coordinator for Washington, provided critical leadership and support as an observer and in a management role during the first half of the season. Forest Entomologist Dana Brennan continued her ADS training throughout the 2025 season, and the program anticipates she will be a fully certified aerial observer by the end of the 2026 season. This will provide much-needed operational flexibility and help the aerial survey program stay committed to providing Washington State with valuable forest health data and ensure consistent monitoring amid significant shifts in federal staffing levels.

For an in-depth description of the methods used to survey forestland in Washington, see the "Aerial Detection Survey Methodology" section on page 50.

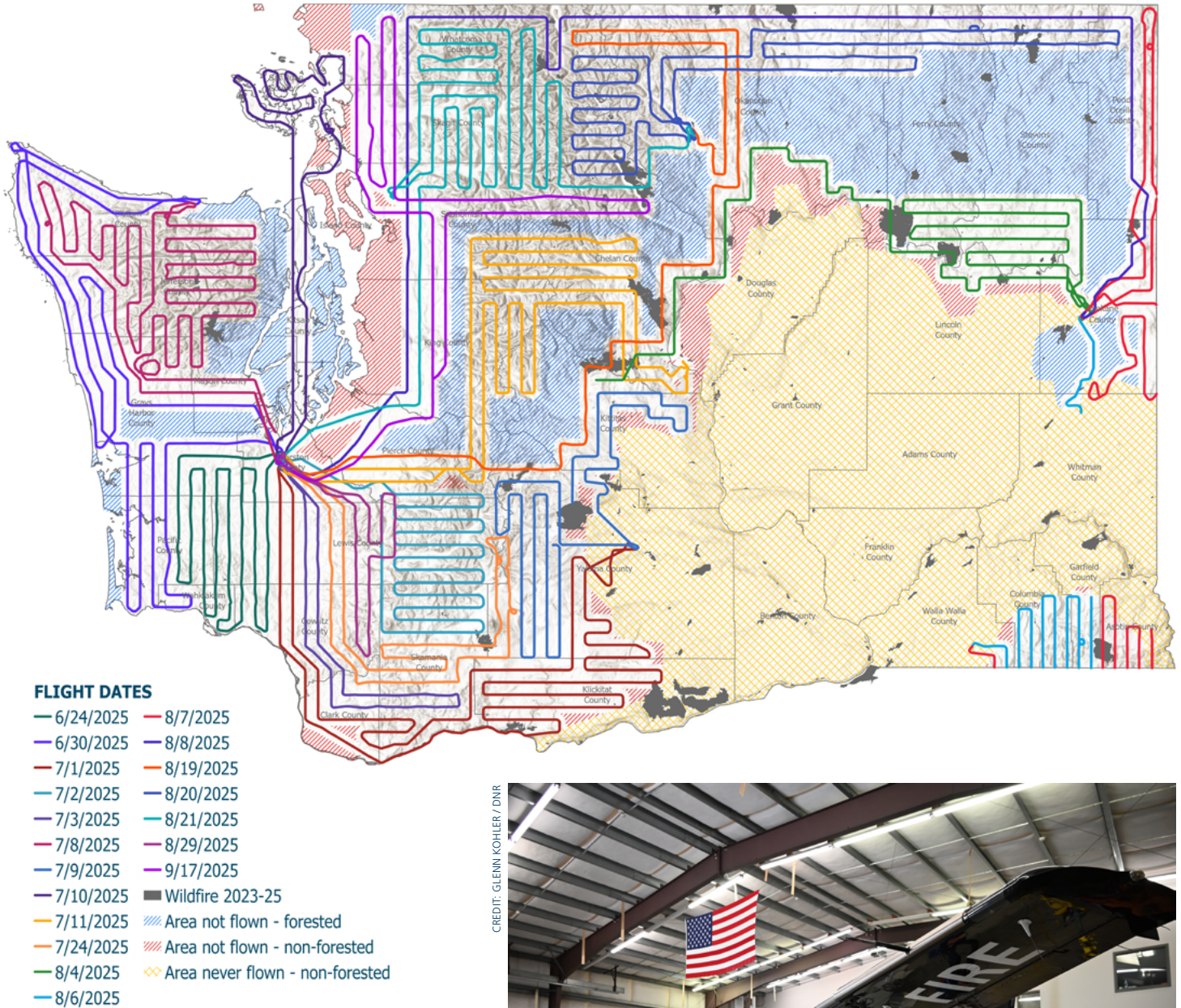
Program leadership for Washington's ADS transitioned from the USFS to DNR mid-season

Figure 2.

2025 | WASHINGTON AERIAL DETECTION SURVEY FLIGHT LINES

Blue and red hatched lines represent areas not surveyed within the typical survey footprint. The yellow cross-hatched area is non-forested and never surveyed. Many forested areas were not surveyed in 2025 due to federal restructuring and programmatic limitations.

SOURCE: DNR, USFS

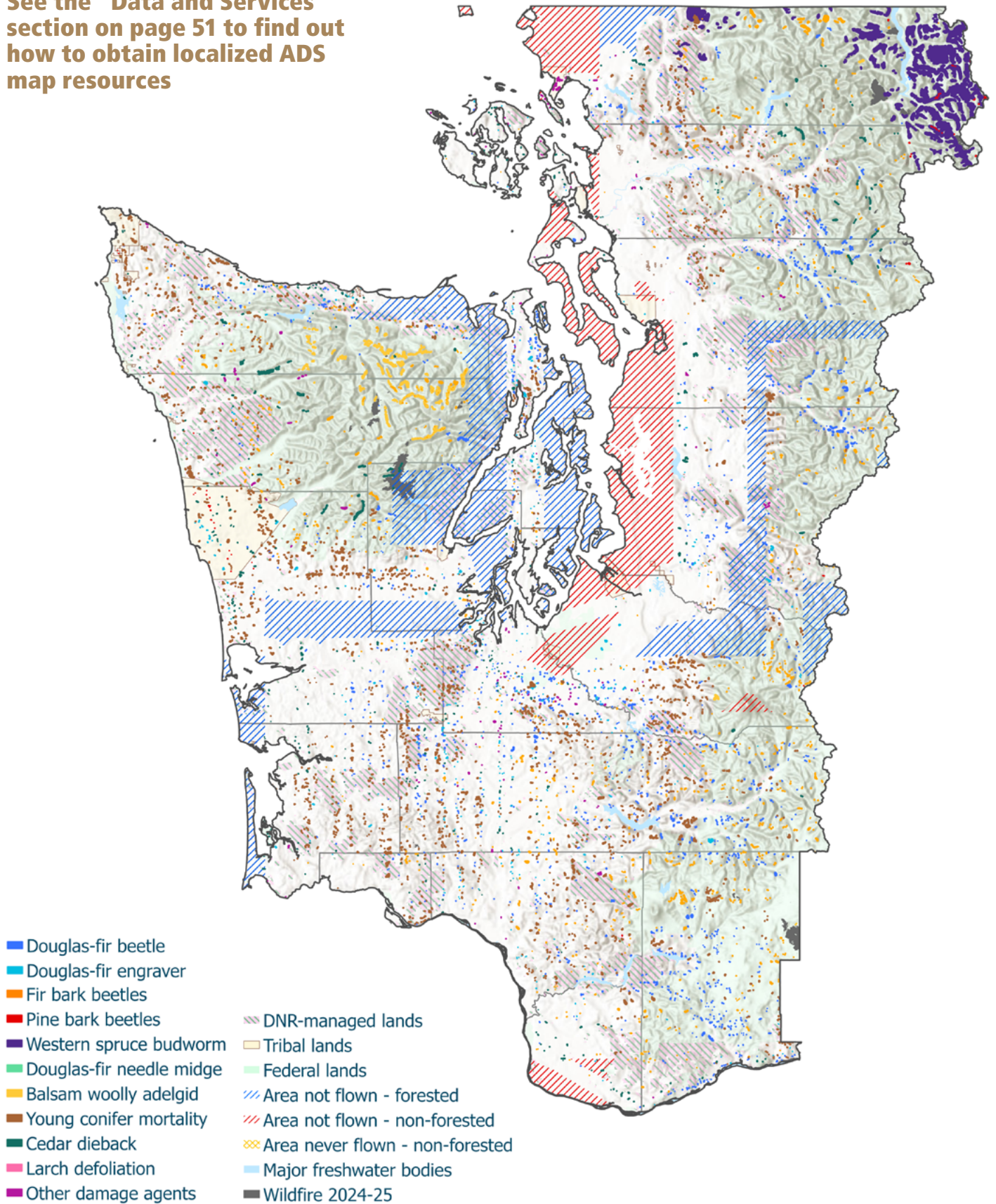


One of DNR's two Kodiaks
used for some flights during
survey season 2025

CREDIT: GLENN KOHLER / DNR



See the “Data and Services” section on page 51 to find out how to obtain localized ADS map resources



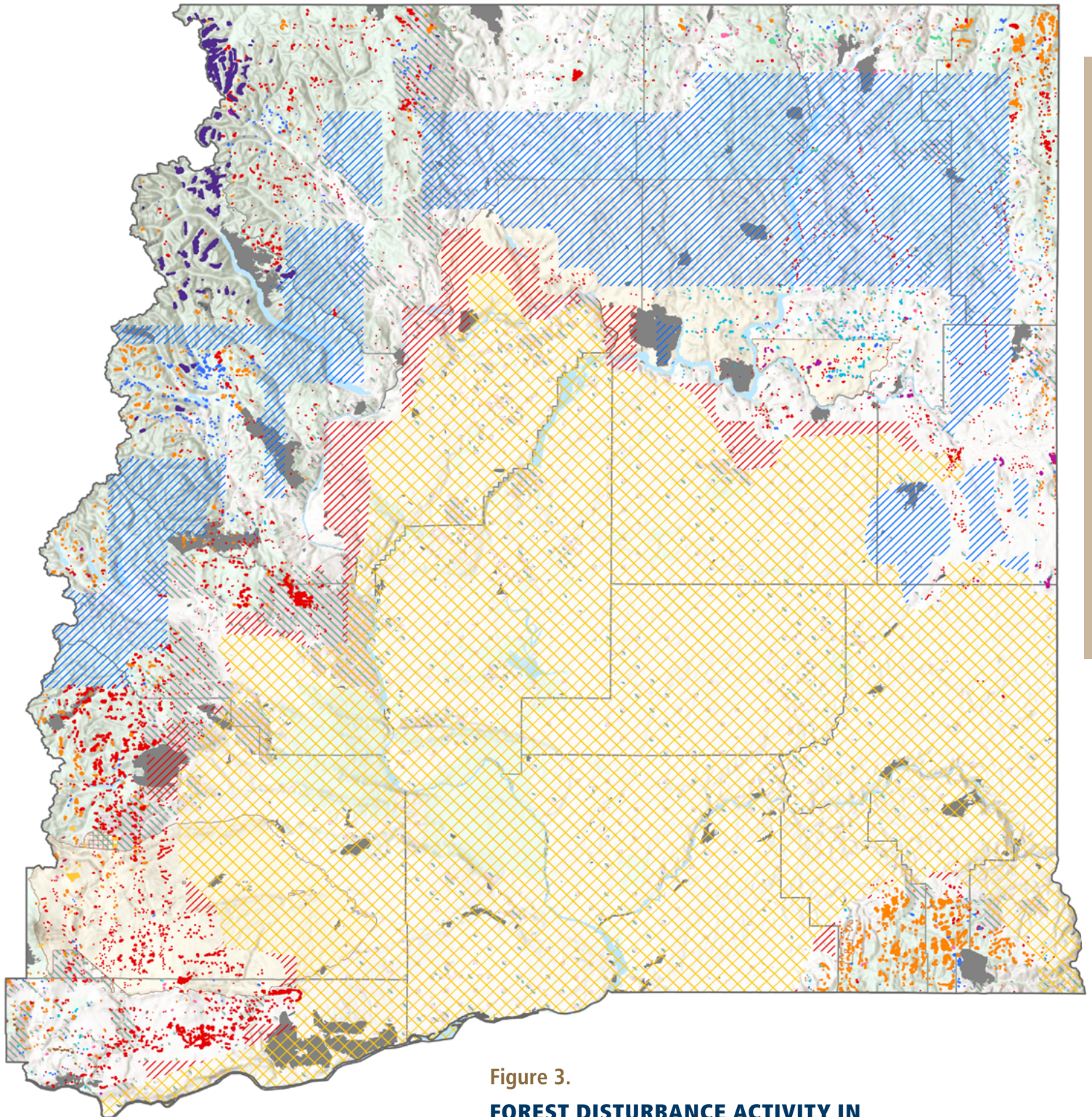


Figure 3.

**FOREST DISTURBANCE ACTIVITY IN
WESTERN & EASTERN WASHINGTON BASED ON 2025
AERIAL DETECTION SURVEY DATA**

Blue and red hatched markings represent areas not surveyed within the typical survey footprint. Polygons mapped within blue hatched areas represent ground survey data.

SOURCE: DNR, USFS


Table 2.
2025 | AERIAL DETECTION SURVEY ACREAGE TABLE

The following table shows agents recorded causing damage on 10 or more acres in the Aerial Detection Survey in 2025, including agent name, the ADS associated code, the agent's primary host(s), the damage type, and total acreage mapped. Agents are organized by acreage. Acres damaged by fire and root disease are excluded (see wildfire and root disease sections for details). Note: only 75% of the annual aerial detection survey was completed in 2025, actual acreage may be higher.

DAMAGE AGENT (CODE)	HOST(S)	DAMAGE TYPE	ACRES
Western spruce budworm (BS)	Douglas-fir, true firs, Engelmann spruce, and western larch	Defoliation	149,200
Young conifer mortality (YCM)	Young conifers	Mortality	57,400
Fir engraver (4_WA)	True firs (primarily grand, subalpine, Pacific silver, and noble)	Mortality	51,000
Mountain pine beetle (6L)	Lodgepole pine	Mortality	24,700
Douglas-fir beetle (1)	Douglas-fir	Mortality	20,00
Balsam woolly adelgid (AB)	True firs (primarily grand, Pacific silver, and subalpine)	Defoliation and mortality	19,800
Western pine beetle (8)	Ponderosa pine	Mortality	19,200
Western balsam bark beetle (5)	Subalpine fir	Mortality	11,600
Redcedar dieback (RCD)	Western redcedar	Crown dieback	5,700
Douglas-fir engraver (2)	Douglas-fir	Topkill	4,800
Redcedar mortality (RCM)	Western redcedar	Mortality	4,300
Dying hemlock (DH)	Western hemlock	Mortality	4,100
Silver fir beetle (9)	Pacific silver fir	Mortality	3,500
Mountain pine beetle (6P)	Ponderosa pine	Mortality	2,800
Ponderosa needle cast (PC)	Ponderosa pine	Defoliation	2,500
Douglas-fir needle midge (MN)	Douglas-fir	Defoliation	1,800
Larch casebearer & larch needle blight (CH)	Larch	Defoliation	1,300
Mountain pine beetle (6B)	Whitebark pine	Mortality	1,300
Pine engraver (7)	All pines	Mortality	1,000
Tent caterpillar (TC)	Hardwoods	Defoliation	920
Hardwood decline (HDM)	Maples	Crown dieback	640
Larch needle cast (RC)	Larch	Defoliation	350
Wind damage (WIND)	All	Mortality	340
Hardwood decline (HD)	All hardwoods	Crown dieback	300



DAMAGE AGENT (CODE)	HOST(S)	DAMAGE TYPE	ACRES
Mountain pine beetle (6W)	Western white pine	Mortality	200
Unknown defoliation (UNKD_Hwd)	Hardwoods	Defoliation	180
Unknown defoliation (UNKD_Con)	Conifers	Defoliation	110
Pacific madrone decline (PMD)	Pacific madrone	Defoliation	100
Water damage (WATR)	All	Mortality	80
Unknown mortality (UNKM_Con)	Conifers	Mortality	40

CREDIT: RACHEL BROOKS / DNR



CREDIT: JUSTIN HOF / USFS



STATEWIDE ADS TREND MAPS

The following three maps display a subset of the 2025 ADS statewide data, including:

- where and what **host trees** are being damaged (Fig. 4),
- where and what **bark beetles** are causing damage (Fig 5),
- and where and what **defoliating insects and other agents** are causing damage (Fig 6).

Localized information from the ADS can be obtained following the steps in the "Data and Services" section on page 51.



CREDIT: RACHEL BROOKS / DNR

Figure 4. FOREST DISTURBANCE ACTIVITY BY HOST SPECIES

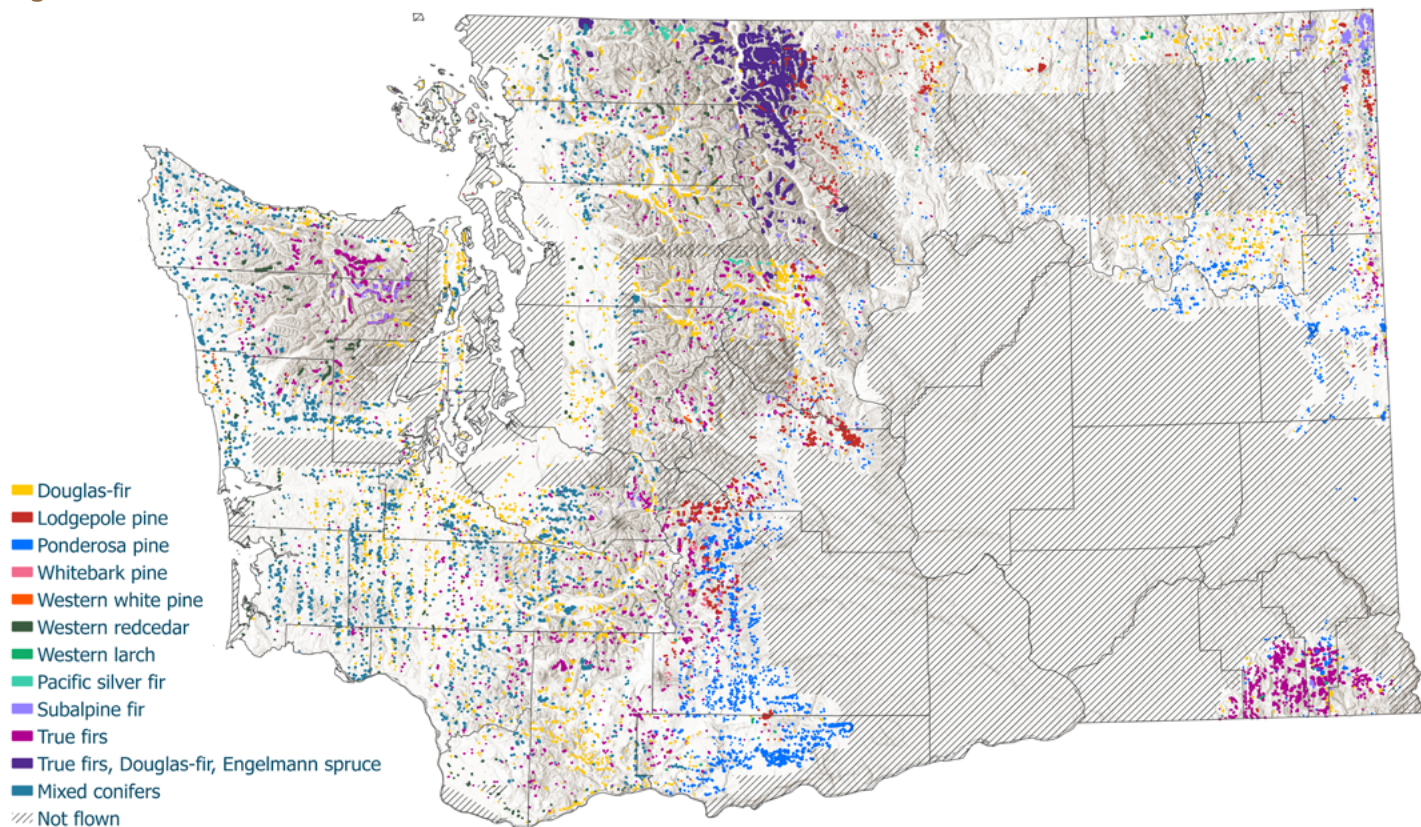


Figure 5. FOREST DISTURBANCE ACTIVITY BY BARK BEETLES

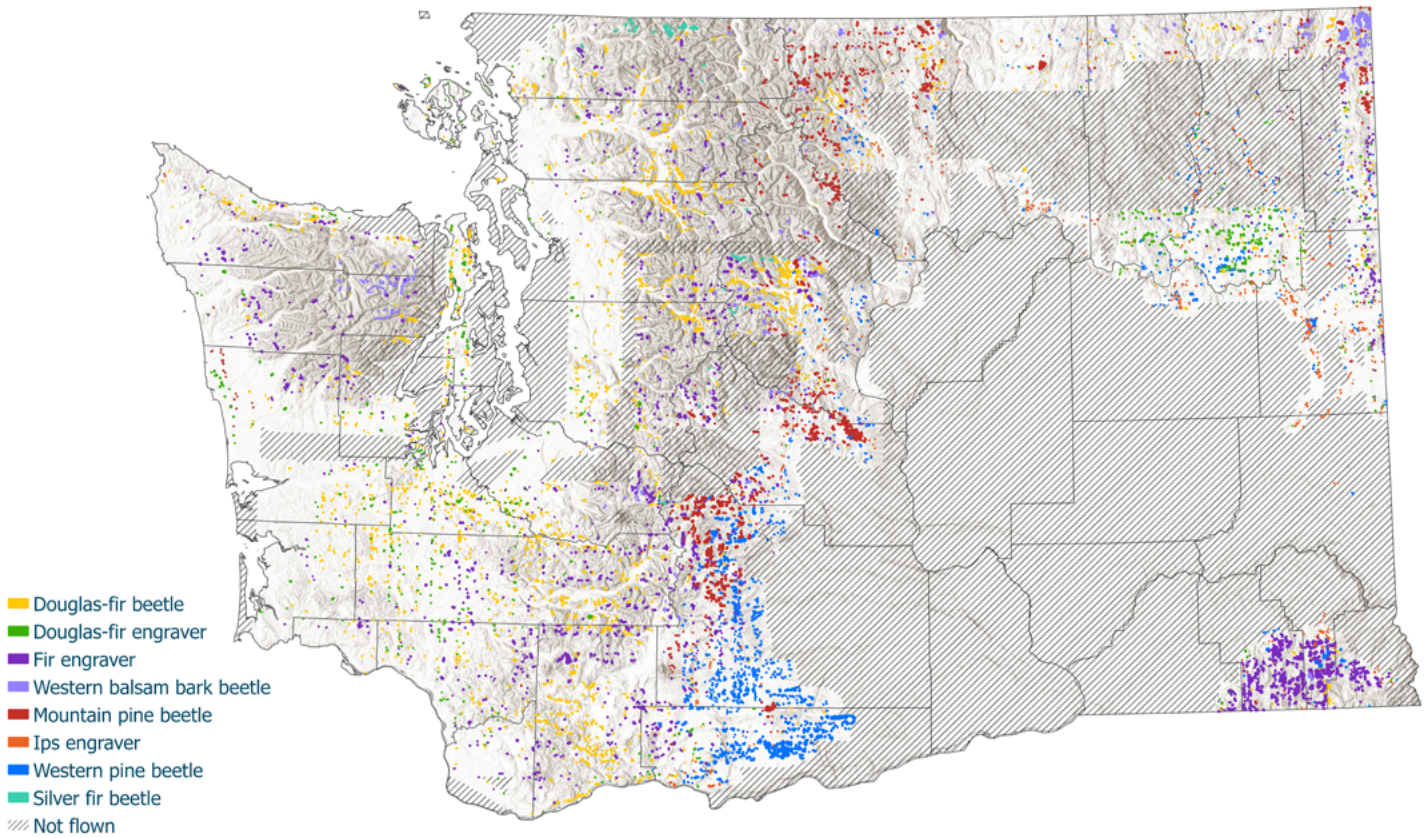
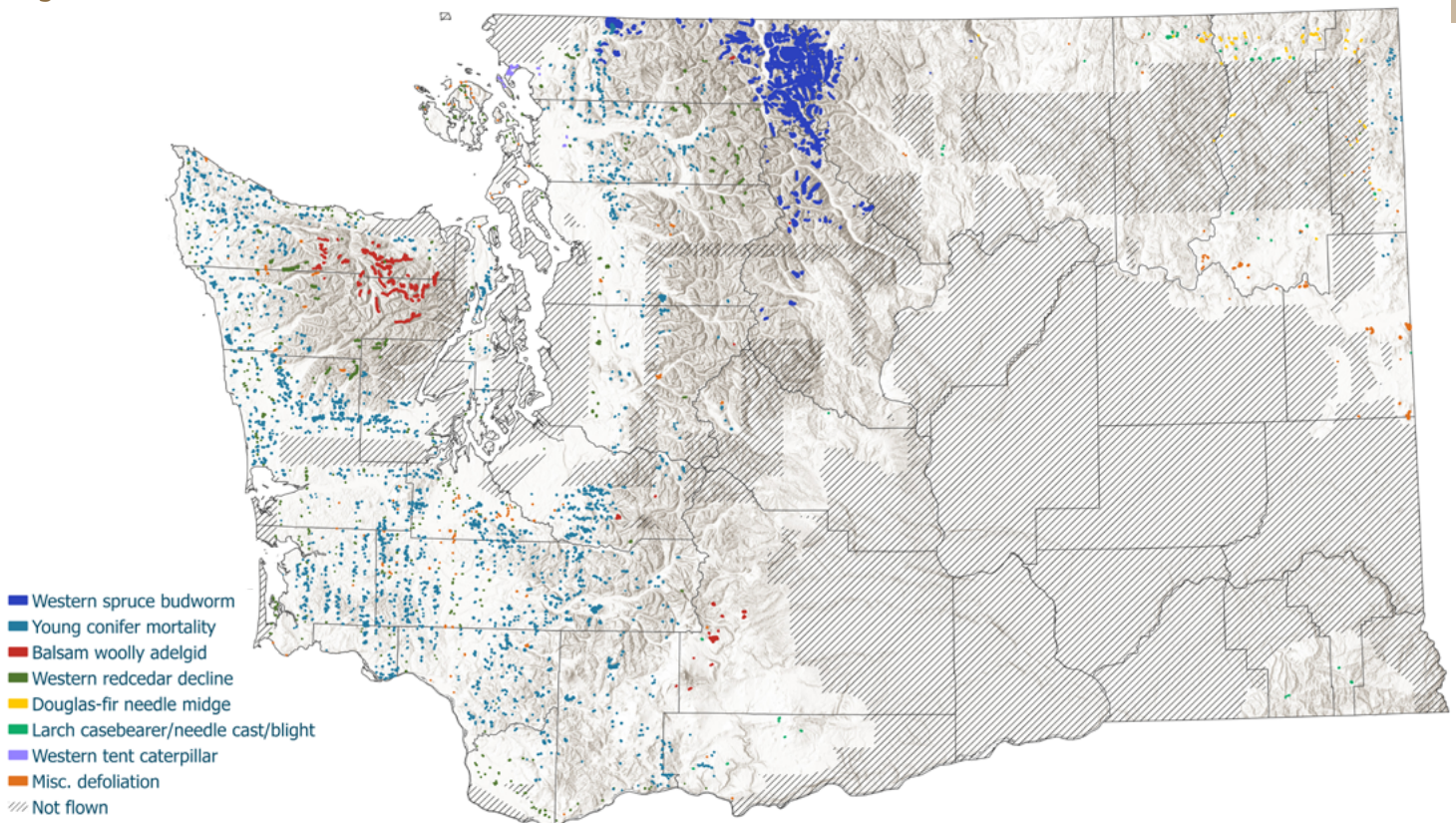


Figure 6. FOREST DISTURBANCE ACTIVITY BY DEFOLIATORS AND OTHER CAUSES





Abiotic Disturbances

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isturbances caused by non-living (abiotic) factors are responsible for both positive and negative changes to our forests. These disturbances may include wildfire, drought, landslides, flooding, and other weather events which can cause tree mortality at both small and large scales. Surviving trees may be damaged or weakened by these events. These abiotic disturbances influence forest structure, composition, and function, and can be important for maintaining biological diversity and facilitating regeneration.

Abiotic disturbances can also influence forests by making them more susceptible to attacks by insects and pathogens. For example, bark beetles can take advantage of large areas of recently dead and damaged trees, which can lead to beetle outbreaks that can kill healthy trees. Symptoms caused by root disease and other pathogens may also increase when tree defenses are compromised. Foliar pathogens, such as needle casts and blights, may become more common in years with abundant spring precipitation and mild temperatures.

The following section is a summary of recent weather, drought, and wildfire events that may influence forest health conditions in Washington.



Thin crowns of Douglas-fir on the San Juan Islands
due to weather, soil, and stand density issues

CREDIT: RACHEL BROOKS / DNR

Figure 7.

WASHINGTON STATE MEAN PRECIPITATION

Statewide average 2025 monthly precipitation departure compared to normal (1901-2000 mean)

SOURCE: NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION (<https://www.ncei.noaa.gov/>)

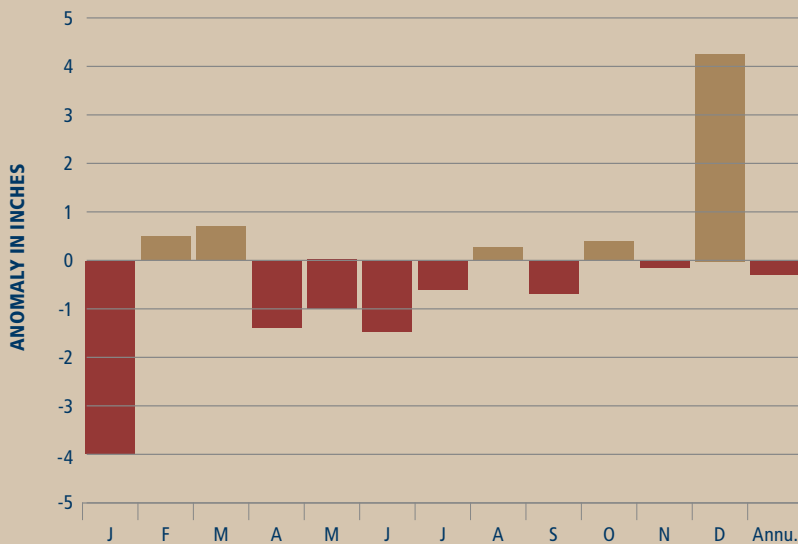
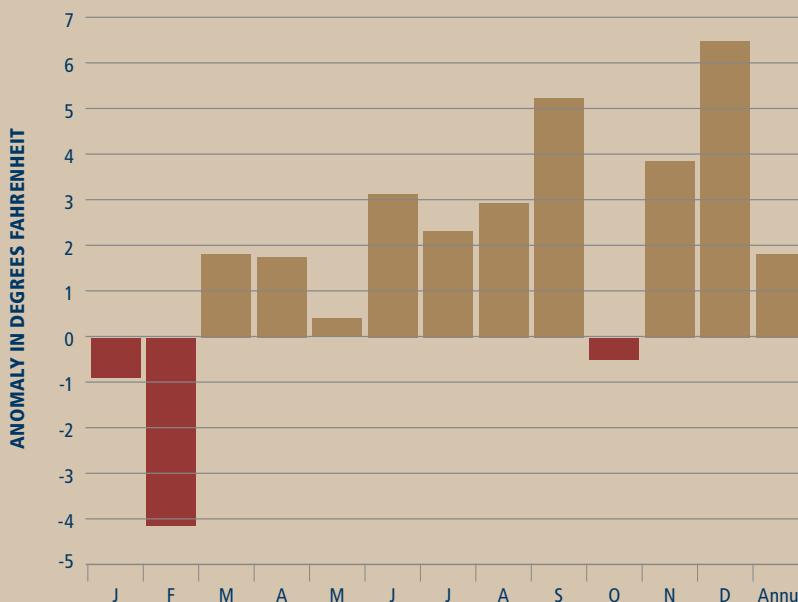


Figure 8.

WASHINGTON STATE MEAN TEMPERATURES

Statewide average 2025 monthly temperature departure compared to normal (1901-2000 mean)

SOURCE: NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION (<https://www.ncei.noaa.gov/>)



WEATHER & CLIMATE

Weather and climate each play an important role in assessing overall forest health; however, it is important to distinguish between the two. Weather impacts occur on timescales of days to weeks and include typical day-to-day conditions as well as significant events such as snowstorms, atmospheric rivers, and heat waves. Climate impacts, by contrast, operate over much longer timescales and reflect long-term trends in a region's weather patterns.

The climate story of 2025 began with colder and slightly wetter conditions than average in February. Any potential for below-average temperatures to persist quickly faded, as above-normal temperatures were recorded for each month from March through September. Notably, September 2025 was the warmest September on record. Overall, the statewide average temperature in 2025 ranked as the second warmest on record, behind only 2015.

A precipitation deficit that began in late 2023 persisted into 2025. Low reservoir levels supplying the Yakima Basin signaled continued drought stress in the central Cascades. During their typical July peak in 2024, reservoir levels at Keechelus Lake, Kachess Lake, and Cle Elum Lake ranged from 52% to 68% of their respective 1991–2020 median values. In 2025, those levels were even lower, ranging from 37% to 66% of median.

The most significant weather and climate story of the year unfolded in December. From a climate perspective, December 2025 was both the warmest and the fifth wettest on record. Back-to-back atmospheric river events from December 8 through December 11 contributed to the fifth-highest statewide, four-day precipitation total since 1981, according to the University of Washington. The resulting impacts included record river levels, catastrophic flooding, and widespread landslides across western Washington.

Significant rain events do help to alleviate drought, and December was no exception. In the next section, we'll discuss drought trends throughout 2025.

DROUGHT

Drought conditions at the start of 2025 were much improved following a 2024 summer that brought areas of severe and extreme drought to the east slopes of the Cascades. The first US Drought Monitor of the year showed only a pocket of moderate drought in the central Washington Cascades, while more than 85% of the state was classified as drought-free.

Conditions shifted markedly by July 2025. Severe drought expanded across the central and northern Washington Cascades, corresponding with the low reservoir levels discussed in the previous section. Severe drought also developed in southeast Washington. At that point, 93% of the state was experiencing some level of drought designation.

By the end of September, the entire state was classified under Moderate Drought, or worse. Extreme drought persisted across the central and northern Cascades and in southeast Washington, where Exceptional Drought conditions in Idaho nudged against Washington's eastern border.

The fall brought significant recovery to the state's drought status, culminating with improvement or complete removal of drought by the end of December. The warm atmospheric river event, however, likely did more harm than good. While it did aid in the removal of drought status, consequences included loss of life and property, as well as significant erosion of mid-elevation snowpack that was already well behind schedule.

Although December did bring improvement to drought conditions overall, the atmospheric river event brought about a new type of drought: a snow drought. The reduction or complete erasure of snowpack, especially between elevations of 3,000 and 6,000 feet, resulted in a well below-average snowpack to begin the winter. This persisted through the end of December and into 2026.

Drought classifications and status described here are based on the US Drought Monitor (<https://droughtmonitor.unl.edu/About/AbouttheData/DroughtClassification.aspx>).

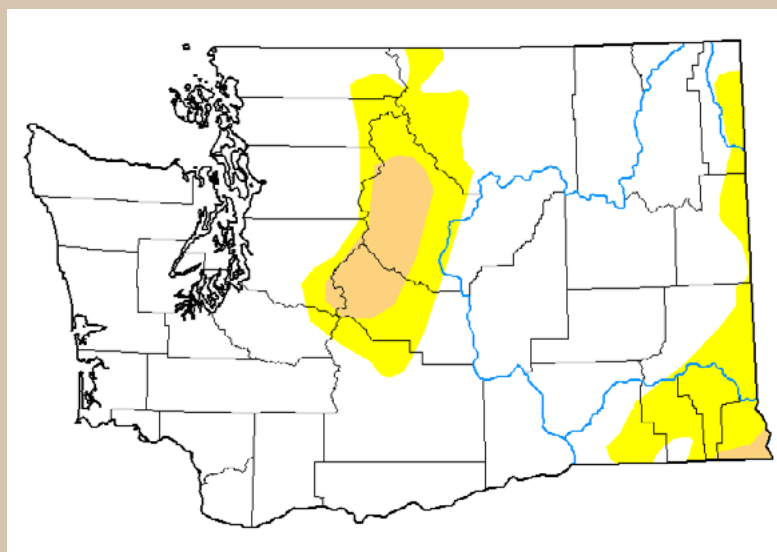


Figure 9.

DROUGHT CONDITIONS IN EARLY-JANUARY, THE LOWEST STATE-WIDE DROUGHT SEVERITY OF 2025

SOURCE: US DROUGHT MONITOR
(<https://droughtmonitor.unl.edu>)

- Abnormally Dry
- Moderate Drought
- Severe Drought
- Extreme Drought
- Exceptional Drought

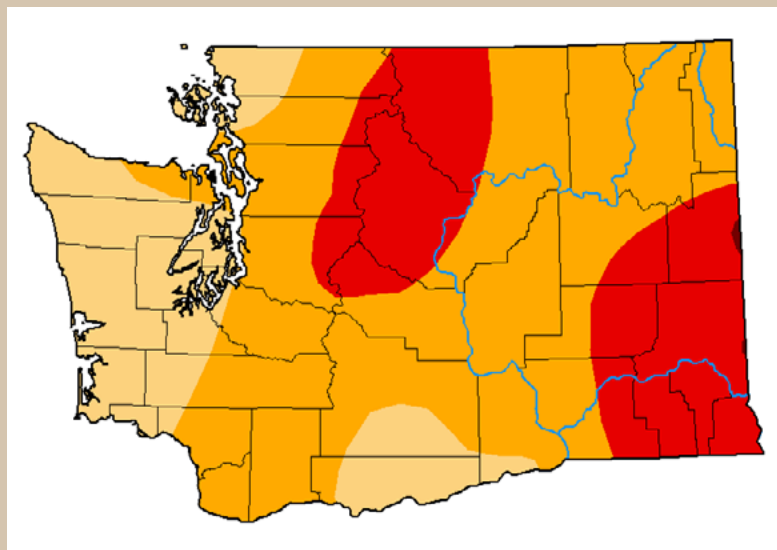
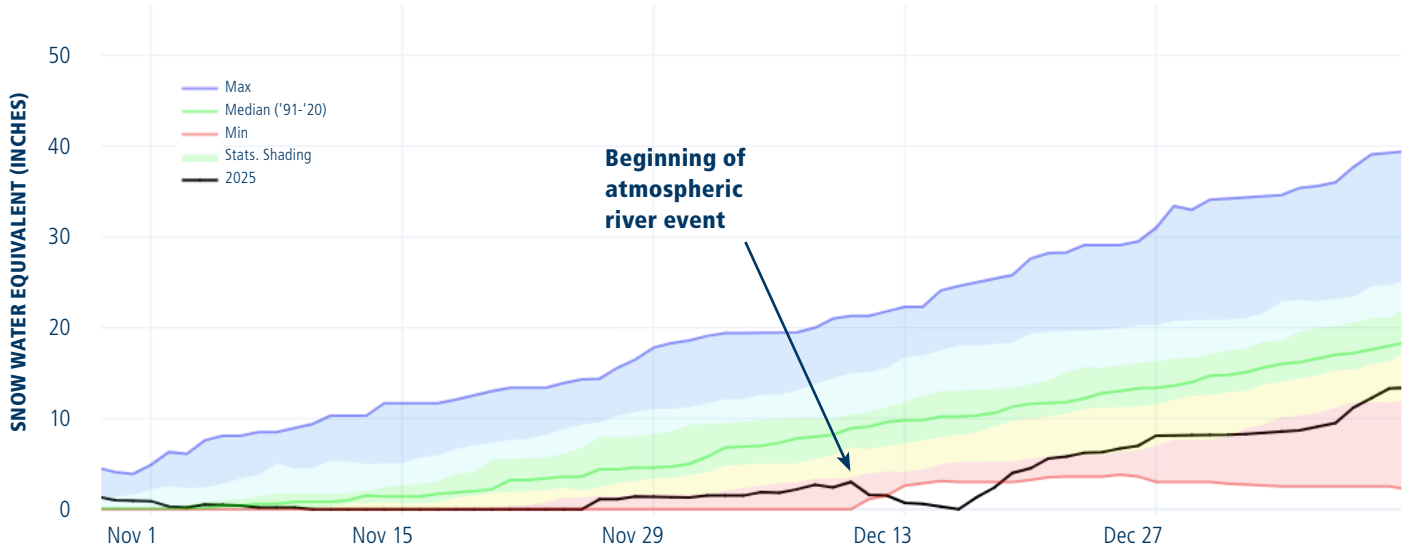


Figure 10.

DROUGHT CONDITIONS IN LATE-SEPTEMBER, THE HIGHEST STATE-WIDE DROUGHT SEVERITY OF 2025

SOURCE: US DROUGHT MONITOR
(<https://droughtmonitor.unl.edu>)

- Abnormally Dry
- Moderate Drought
- Severe Drought
- Extreme Drought
- Exceptional Drought



SNOW WATER EQUIVALENT CHART AT STEVENS PASS (ELEV. 3940') Figure 11.

Arrow highlights the melting of snow during the December 2025 atmospheric river event.

SOURCE: US DROUGHT MONITOR (<https://droughtmonitor.unl.edu>)

CREDITS: DANA BRENNAN / DNR



The trend towards hotter and drier summers in Washington puts more of the state at risk of drought earlier in the dry season

A group of drought stressed Douglas-fir south of Colville displaying typical top-down outside-in dieback.



WILDFIRE

The 2025 wildfire season in Washington was defined by severe drought, record heat, and late-season lightning that produced widespread fire activity across the state. Despite these challenges, DNR and partner agencies maintained strong preparedness and rapid response performance, containing 94% of fires to under 10 acres and preventing major community losses with no civilian or firefighter fatalities.

Despite near-average temperatures helping to preserve snowpack through 2025's winter months, drought began to reemerge by the end of winter along the crest of the Cascades due to below-average precipitation totals. With less water stored in the snowpack than usual, winter snowpack peaked 1 to 3 weeks earlier than normal for much of the Washington high terrain by the end of March.

Snowmelt was already in progress by April. The polar front jet was beginning to migrate northward for the summer and increasing weather condition volatility between cool/wet and warm/dry. The stage was set for fire danger to increase rapidly through the spring months if persistent warm/dry conditions developed. Drought rapidly intensified through the spring months as warm and dry conditions hastened snowmelt and kickstarted an early start to the growing season for live fuels. Statewide spring precipitation totals were lower than 90% of years in the 131-year observation record. Kittitas County recorded their driest spring on record.

After a flurry of new large wildfires ignited during July and the first half of August, fire season entered a relative lull for the remainder of the season. Temperatures remained above average during this time, but intermittent wet thunderstorms and a lack of substantial heat waves kept fire danger at a relative plateau. Despite elevated fire danger and a continued stream of ignitions, new fires struggled to escape initial attack during this period.

The 2025 fire season shifted into a new gear during the last week of August and the first week of September. Several rounds of dry thunderstorms pushed through the state between August 29 and September 2, igniting seven new large fires including the Labor Mountain, Lower Sugarloaf, Crown Creek, Katy Creek, Lynx Mountain, Rattlesnake, and Tacoma Creek fires.

Washington experienced 1,102 fires on DNR-protected lands through September 30, the third lowest total since 2016. This date represents the last day of the most active firefighting activity normally experienced. While 24 large fires burned 182,969 acres statewide, total acreage on DNR jurisdiction (75,897 acres) was well below the 10-year average. The largest incidents - Lower Sugarloaf, Labor Mountain, Rattlesnake, and Bear Gulch - were driven by drought-stressed fuels and early-September heat. From January 1 through September 30, about 60% of burned acres were classified as forested.

As of September 30, debris and open burning remained the leading confirmed source of human-caused fire starts, with 250 incidents accounting for 22.7% of all fires and 32.9% of all confirmed human-caused fires. The second most common source was equipment and vehicle use, responsible for 127 fires, representing 11.5% of all fires and 16.7% of all human-caused incidents. There was a slight uptick from 95 lightning-caused DNR wildfires in 2024 to 122 lightning-caused wildfires in 2025.

CREDIT: CARSON ZEPP / DNR



Firefighting activity at Crown Creek fire in Stevens County, September 2025

For more information, refer to the:

- Wildfire Season 2025 Legislative Report (https://dnr.wa.gov/sites/default/files/2026-03/rp_annual_wildfire_suppression_report_2025.pdf)
- Fire Year Story Map (<https://storymaps.arcgis.com/stories/a67a3b5149914f74910547e67db5647e>).

Figure 12.

2025 LARGE FIRES OF CONCERN

Locations of large wildfires and other fires that occurred in Washington in 2025. Large fire names in text boxes.

DATA SOURCES: NATIONAL INCIDENT FEATURE SERVICE 2024 (NIFC), DNR FIRE STATISTICS 2024 (EIRS)

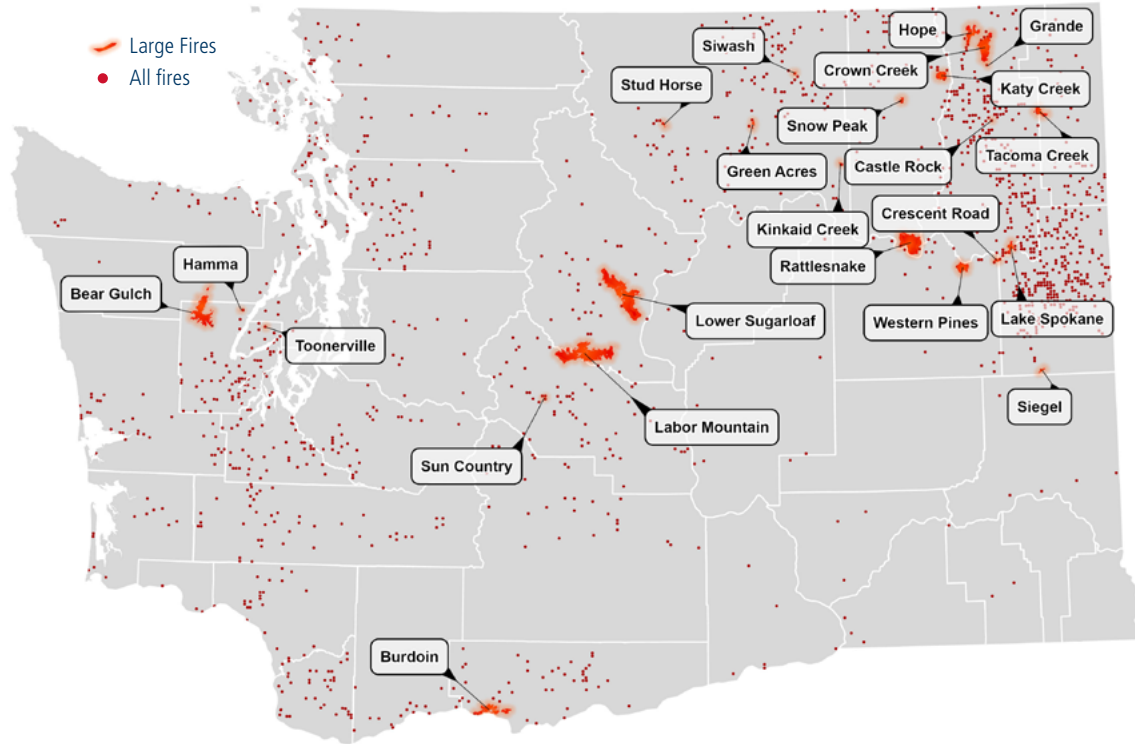
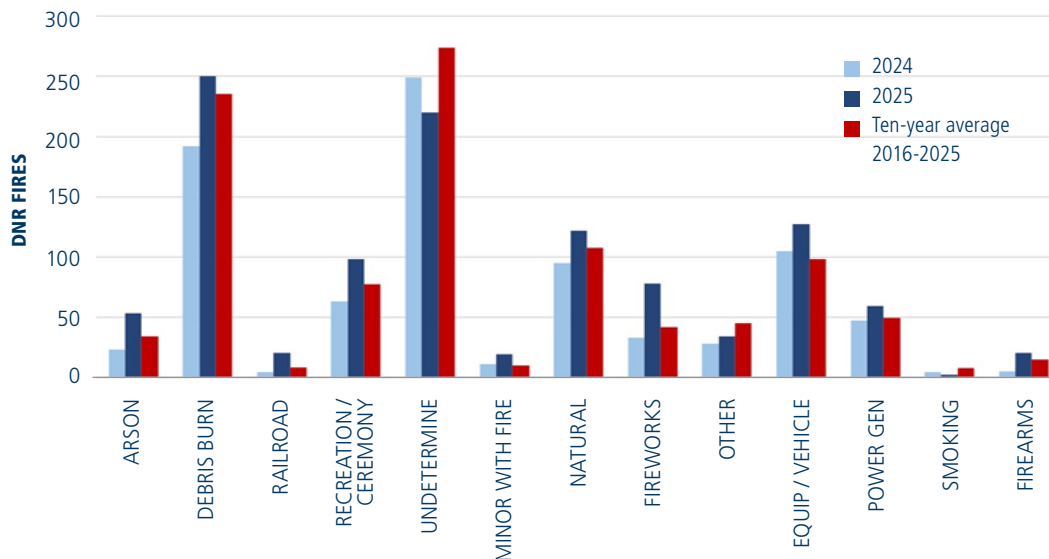


Figure 13.

2025 STATEWIDE DNR FIRES BY GENERAL CAUSE CATEGORY

Human causes include arson, debris burning, railroad, celebration (campfires associated with recreation or ceremony), and other causes. Natural causes are associated with lightning. Undetermined causes include fires under investigation as of 12/31/2025.

SOURCE: DNR FIRES DATABASE



Large fires burned 183,000 acres statewide, of which about 60 percent were forested

Biotic Disturbances

D

isturbances caused by living (biotic) agents such as insects, fungi, animals, and parasitic dwarf mistletoe plants can directly cause

tree mortality or weaken trees and predispose them to attacks from other pests or stressors. Unlike abiotic disturbances, forest insects and pathogens typically attack a specific tree species or group of tree species, so damage may be limited in mixed-species forests.

In Washington, both native and non-native pests and pathogens influence our forest systems.

At low levels, native insects and pathogens play important ecological roles in nutrient cycling of dead plant material and removal of weak and suppressed trees, leaving healthier trees with more access to water, light, and nutrients. At high levels, pathogen and pest outbreaks can cause significant changes to stand structure and forest composition over time.

Non-native forest insects and diseases such as the emerald ash borer and sudden oak death (causal agent *Phytophthora ramorum*) that are currently causing damage in neighboring states pose major threats to Washington's forests if they become established here.

The following section is a summary of forest insect and disease damage trends and conditions from 2025 collected through a combination of aerial detection surveys, ground monitoring, and field observations.



CREDIT: RACHEL BROOKS / DNR



CREDIT: DANA BRENNAN / DNR

Top right: Sporulating western gall rust on lodgepole pine branch.

Right: Aspen leafminer damage in 2025 near Flowery Trail Pass.

INSECTS | BARK BEETLES

CREDIT: GLENN KOHLER / DNR



Pine Bark Beetles (Mountain Pine Beetle, Western Pine Beetle, & Pine Engravers)

(*Dendroctonus ponderosae* Hopkins, *Dendroctonus brevicornis* LeConte, & *Ips* spp.)

NATIVE

The area with mortality caused by all major pine bark beetle species in 2025 was approximately 49,200 acres, which is well below the ten-year average of 120,000 acres and the lowest level in the last decade (Fig. 14). Much of this decrease is likely due to a reduction in the acres surveyed. In 2025, only 75% of the forested area typically surveyed was completed (see page 6 for explanation). Relative to 2024, acres with mortality caused by all major pine bark beetle species decreased (Table 3).

Mountain pine beetle (MPB) damage decreased from 83,600 acres in 2024 to approximately 29,000 acres in 2025. The majority of pine bark beetle mortality recorded each year is in lodgepole pine. In 2025, the total area with lodgepole pine killed by MPB was approximately 24,700 acres. Recent areas with MPB-killed lodgepole pines in eastern Washington totaled 67,300 acres in 2024 and 76,100 acres in 2023.

The highest concentrations of MPB mortality in lodgepole in 2025 were mapped: in the Simcoe Mountains on the Yakama Indian Reservation west of Satus Pass; around the William O. Douglas Wilderness area in Yakima County; along the Kittitas-Chelan county border including the Colockum Pass area between Wenatchee and Ellensburg; around the Lake Chelan-Sawtooth Wilderness area and the Pasayten Wilderness Area; in the Loomis State Forest; around Mount Bonaparte in northwest Okanogan County; and in eastern Pend Oreille County. Significant forested areas of several eastern Washington counties were not surveyed in 2025 (Fig. 5).

MPB-caused mortality in ponderosa pine was mapped on 2,800 acres in 2025, well below the 10-year average of about 16,900 acres. Observers recorded approximately 1,300 acres with MPB-caused mortality of whitebark pine in 2025. Areas with high

CREDIT: MELISSA FISCHER / USFS



Ponderosa pine mortality caused by pine engraver beetles (*Ips pini*).

concentrations of whitebark pine mortality included high elevation areas on the east side of Mount Adams, the upper Ahtanum and White Pass in Yakima County, along the Chelan-Okanogan County border, and in western Okanogan County north of Mazama and northeast into the Pasayten Wilderness Area. Observers mapped approximately 200 acres with western white pine mortality in 2025. Some mortality in whitebark pine and western white pine may be due to the non-native white pine blister rust disease directly killing trees or predisposing infected trees to attack by MPB.

Mortality of ponderosa pine due to western pine beetle (WPB) has increased steadily since 2012. Mapped acreage reached a peak of 44,300 acres in 2022 before

decreasing to 32,800 acres in both 2023 and 2024 – still above the 10-year average of 27,200 acres (Fig. 15). In 2025, the area with WPB mortality decreased to approximately 19,200 acres, the lowest level since 2018; however, much of that decrease can be attributed to reduced survey area and not necessarily a decline in the WPB activity. The acreage recorded in 2022 marked the highest amount of WPB damage recorded since 2006. WPB damage has been widely reported throughout eastern Washington. Recent drought conditions are likely an important driver of these increases. Despite the downward trend in total acres, there was a continued increase in WPB outbreak activity in lower elevation forested areas of Klickitat County and the western portion of the Yakama Indian Reservation. Other concentrations

of scattered WPB-caused mortality occurred in central Kittitas County, northern Lincoln County, and throughout Stevens and Spokane Counties.

Pine mortality attributed to Ips pine engravers was mapped on approximately 1,000 acres in 2025, a decrease from the 1,850 acres mapped in 2024 and below the 10-year average of 1,900 acres. Ponderosa pine was the most common species affected. Some of the same areas are also experiencing WPB outbreaks, which have a very similar aerial survey damage signature in young ponderosa pines.

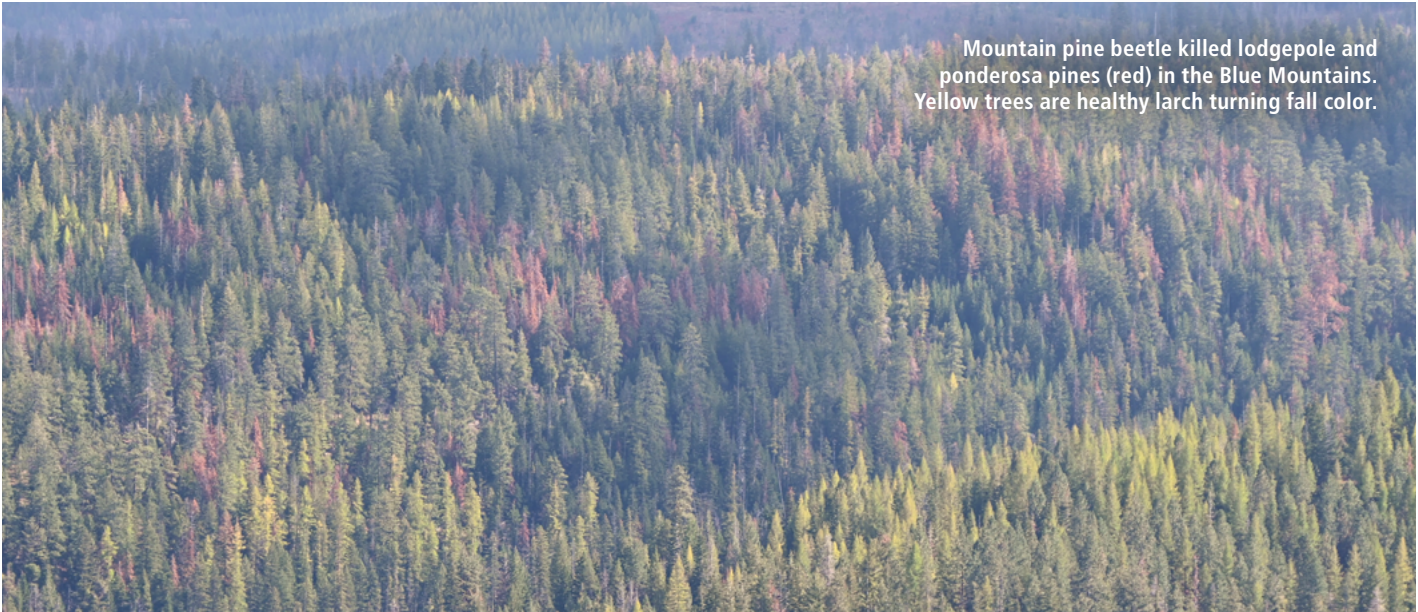


CREDIT: MELISSA FISCHER / USFS

PINE BARK BEETLE DAMAGE IN WASHINGTON OBSERVED IN AERIAL DETECTION SURVEY Table 3.

BEETLE SPECIES	HOST(S)	2024 ACRES WITH MORTALITY	2025 ACRES WITH MORTALITY*
Mountain pine beetle	Lodgepole pine	67,300	24,700
Mountain pine beetle	Ponderosa pine	7,300	2,800
Mountain pine beetle	Whitebark pine	8,800	1,300
Mountain pine beetle	Western white pine	200	200
Western pine beetle	Ponderosa pine	32,800	19,200
Pine engravers (<i>Ips</i> species)	All pines	1,900	1,000
Totals		118,200	49,200

Note: Multiple host species can be recorded in a single area, therefore the sum of acres for all hosts can be marginally greater than the total footprint affected.
*Only 75% of the annual aerial detection survey was completed in 2025 due to challenges with federal staff vacancies and programmatic limitations.

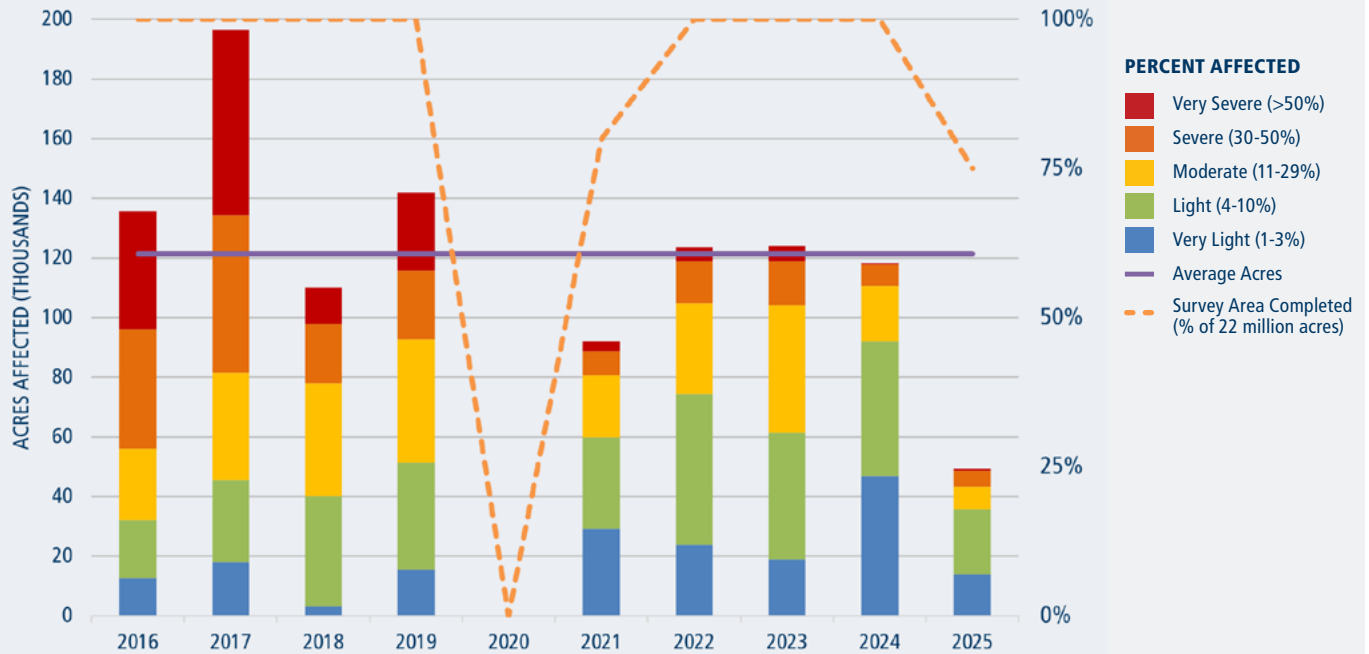


CREDIT: ISAAC DAVIS / DNR



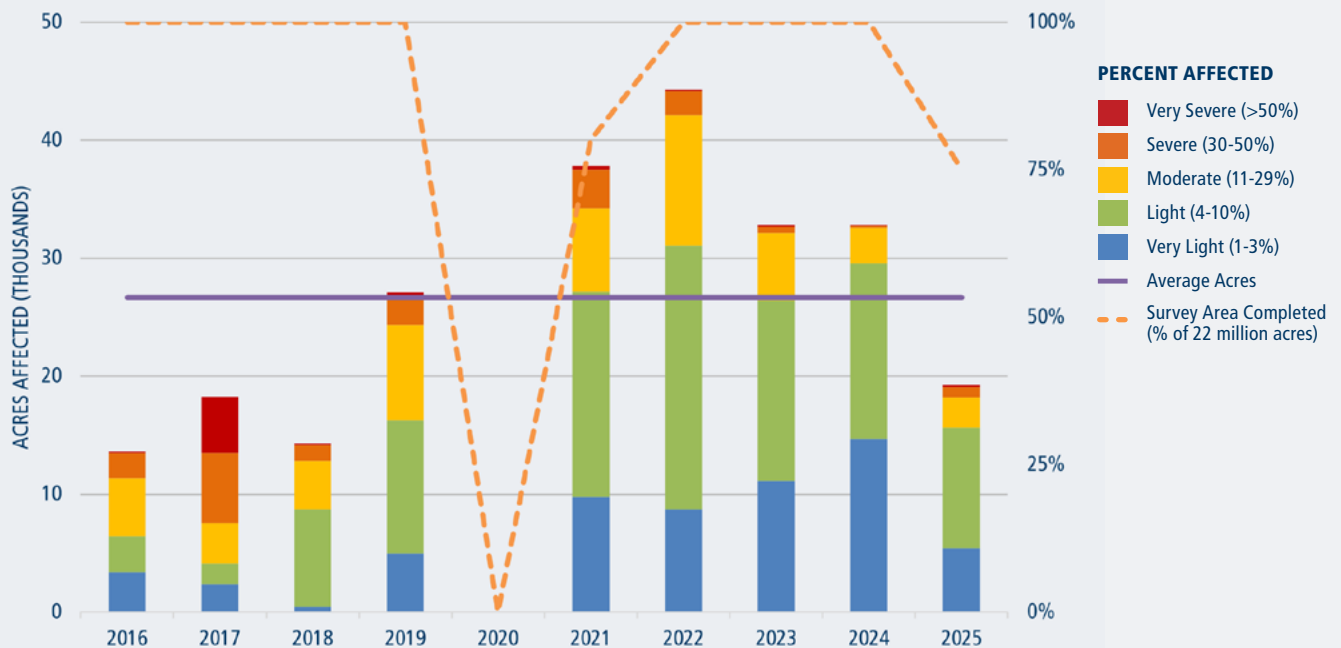
ALL PINE BARK BEETLES 10-YEAR TREND FOR TOTAL ACRES AFFECTED IN WASHINGTON

Figure 14.



WESTERN PINE BEETLE 10-YEAR TREND FOR TOTAL ACRES AFFECTED IN WASHINGTON

Figure 15.





CREDIT: MELISSA FISCHER / USFS

Pine engraver beetle (*Ips pini*) gallery



CREDIT: MELISSA FISCHER / USFS

Western pine beetle gallery



CREDIT: GLENN KOHLER / DNR

Mountain pine beetle gallery

LOOK UNDER THE BARK!

Bark beetles feed and lay eggs between the bark and the wood of a tree. The tunnels they leave behind are called "galleries". Different species of bark beetles make different shaped galleries. You can often identify a bark beetle to species if you know the tree species impacted, the diameter of the impacted branch or trunk, and the beetle's gallery pattern. Check out the pine bark beetle galleries above and compare their gallery shapes!



CREDIT: MELISSA FISCHER / USFS

INSECTS | BARK BEETLES

CREDIT: PEST AND DISEASES
IMAGE LIBRARY / BUGWOOD.ORG**California Fivespined Ips***(Ips paraconfusus Lanier)***NATIVE**

California fivespined Ips (CFI), a pine engraver beetle native to Oregon and California, was first detected in Washington State in 2010. It has either expanded its range or re-occupied a historic range. To date, CFI has been detected in 14 Washington counties, extending the previously reported range in 1987 by approximately 150 miles to the north and 200 miles to the east. Localized outbreaks of CFI continue to cause unusually high levels of ponderosa pine mortality in forested areas along the Columbia River Gorge in Skamania and Klickitat counties.

The first known occurrence of CFI killing pines in western Washington was in native ponderosa pines at Joint Base Lewis-McChord (JBLM) in 2022, but that outbreak has since subsided. In 2023 and 2024, several locations from Bothell south to Tacoma experienced scattered mortality of pines in urban, park, and roadside settings. Hosts killed include shore pine, western white pine, and Austrian pine. These were new host records for CFI in Washington. Since 2025, observations and reports of CFI-caused pine mortality in the Puget Sound area appear to have declined.

Increased tree stress due to recent droughts and extreme temperatures, such as the 2021 “heat dome” event, are likely contributors to most of the CFI damage observed in western Washington. CFI and other Ips pine engraver beetles can also build up damaging outbreak populations in freshly killed pine trees and large diameter branches (down to 3-inch diameter) from storms, fires, logging, or thinning slash available in spring. Landowners and managers working on thinning

CREDIT: MELISSA FISCHER / USFS



California fivespined Ips spines on back of elytra (wing covers).

projects in pine stands should consider using slash management methods and/or timing projects for late summer and fall; techniques commonly used east of the Cascades to control *Ips pini*, the other native pine engraver beetle, which is a well-known forest pest.

DNR and the USFS are partially funding a Washington State University research project in 2025 and 2026 to more closely examine potential relationships between increased CFI activity and drought stress in host trees.

Those working on thinning projects in pine stands in western Washington should now consider using slash management methods or timing projects for late summer and fall.



INSECTS | BARK BEETLES

CREDIT: PEST AND DISEASES
IMAGE LIBRARY / BUGWOOD.ORG



Douglas-fir Beetle

(*Dendroctonus pseudotsugae* Hopkins)

NATIVE

Mortality due to Douglas-fir beetle (DFB) has been increasing in recent years, reaching a peak of 105,000 acres in 2022, the highest level recorded since 2001. The area with DFB damage in 2025 decreased to approximately 20,600 acres, down from 42,800 acres mapped in 2024 and below the 10-year average of 52,100 acres (Fig. 16). Much of this decrease is likely due to a reduction in the acres surveyed. In 2025, only 75% of the forested area typically surveyed was completed (see page 6 for explanation). Scattered areas of DFB-caused mortality were detected throughout western Washington, with higher concentrations in Skamania, Lewis, Thurston, King, Snohomish, Skagit, Mason, and Clallam counties. In eastern Washington, the highest concentrations were in central Chelan County around Lake Wenatchee, northwest Okanogan County in the Loomis State Forest and north of Mazama, southern Stevens County, and in the Blue Mountains in southeast Washington.

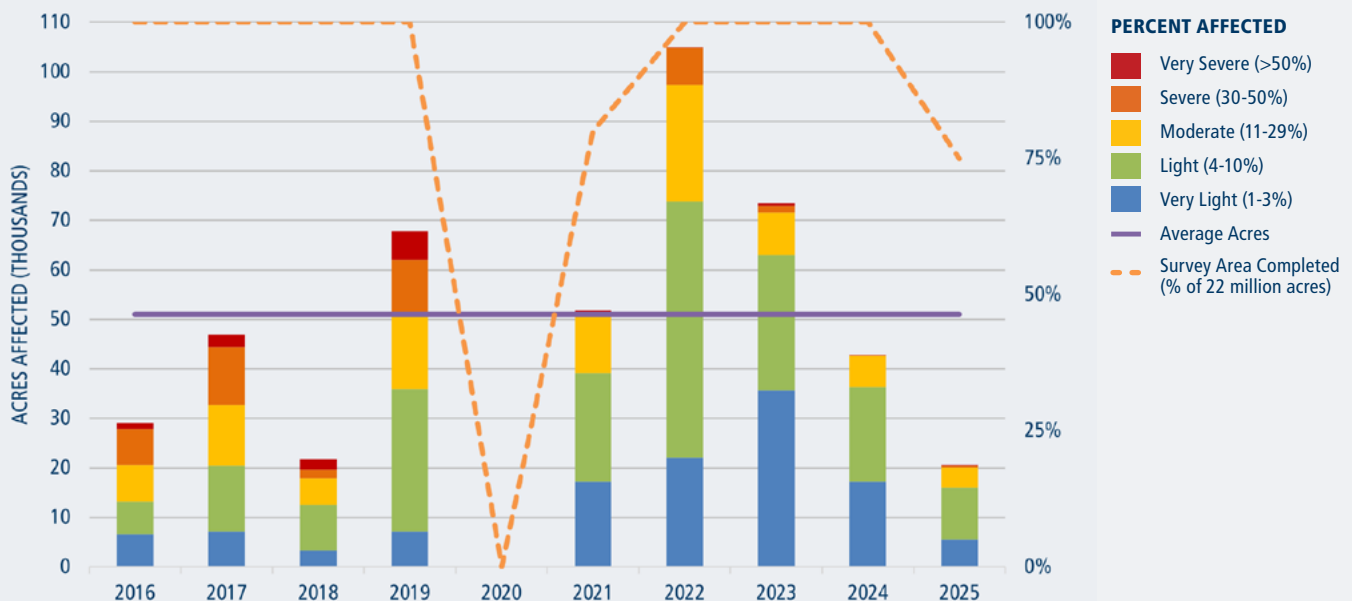
CREDIT: RACHEL BROOKS / DNR



Douglas-fir beetle damage in 2025

DOUGLAS-FIR BEETLE 10-YEAR TREND FOR TOTAL ACRES AFFECTED IN WASHINGTON

Figure 16.



INSECTS | BARK BEETLES

Secondary Bark Beetles in Douglas-fir

(*Scolytus monticolae* Swaine, *Scolytus unispinosus* LeConte, and *Pseudohylesinus nebulosus* LeConte)

NATIVE

The aerial survey damage signature of dead tops and branch flagging in Douglas-fir is attributed to Douglas-fir engraver (*Scolytus unispinosus*). However, this type of damage is also caused by at least two other secondary bark beetle species: Douglas-fir pole beetle (*Pseudohylesinus nebulosus*) and *Scolytus monticolae*. This group of bark beetles is considered “secondary” because they are not typically the primary killers of healthy trees but tend to attack trees stressed by other factors like drought. All three species can infest the same tree and are difficult to distinguish based on their egg and larval galleries alone.

Observers mapped approximately 4,800 acres of Douglas-fir engraver damage in 2025, a decrease to less than half the 12,700 acres mapped in 2024. Much of this decrease is likely due to a reduction in the acres surveyed. In 2025, only 75% of the forested area typically surveyed was completed (see page 6 for explanation). The 25,600 acres with Douglas-fir engraver damage mapped in 2023 marked the highest level recorded in Washington aerial surveys since 1969. Another recent peak of 20,300 acres with Douglas-fir engraver damage occurred in 2019, well above the 10-year average of 10,000 acres. Decreased activity may be due to some recent reduction in drought conditions. The highest concentrations of damage in western Washington were in eastern Jefferson County, Kitsap County, Grays Harbor County, and scattered throughout the Cascade foothills. In eastern Washington, the highest concentrations of damage were in western Klickitat County, and in southern Stevens and Ferry counties.

Attacks by these species usually occur in small diameter Douglas-fir trees or to the tops and branches of larger trees, resulting in a patchy pattern of dieback in mature Douglas-fir tree crowns. Secondary bark beetle species do not typically cause mortality, especially in mature trees. Stressors such as drought and root disease may predispose Douglas-fir to attack by these species. Attacks during drought are more likely to be successful and cause mortality.

CREDIT: MELISSA FISCHER / USFS



CREDIT: JUSTIN HOF / USFS



Top: Douglas-fir damaged by secondary bark beetles
Right: Douglas-fir engraver damage seen from the air



INSECTS | BARK BEETLES

CREDIT: DONALD OWEN, CA DEPT.
OF FORESTRY AND FIRE PROTECTION,
BUGWOOD.ORG



Fir Engraver

(*Scolytus ventralis* LeConte)

NATIVE

The fir engraver beetle can attack all species of true fir (*Abies* spp.) in Washington, but its primary hosts are grand fir and noble fir. Fir engraver-caused mortality, primarily in grand fir, has been steadily increasing since 2015 and reached a 10-year high of 166,300 acres in 2019, more than twice the area recorded in 2018 (Fig. 17). Following a drop to 52,500 acres in 2021, the upward trend resumed with an increase in 2023 to 99,000 acres. Acres affected decreased in 2025 to approximately 51,000, below the 10-year average of 73,700 acres. Part of this decrease may be due to a reduction in the acres surveyed. In 2025, only 75% of the forested area typically surveyed was completed (see page 6 for explanation).

The most concentrated areas of mortality in eastern Washington were throughout the Cascade Mountain areas of Klickitat, Yakima, Kittitas, and Chelan counties; in the Kettle River Range and Selkirk Mountains in Stevens and Pend Oreille counties; in northern Spokane County; and in the Blue Mountains in southwest Washington. Areas with the most damage west of the Cascades were scattered throughout the Cascade foothills in Skamania, northeast Cowlitz, Lewis, Pierce, King, and Snohomish counties. There were also higher concentrations of mortality on the lower elevation slopes of the Olympic Mountains.



CREDIT: JUSTIN HOF / USFS

Fir engraver damage seen from the air.

FIR ENGRAVER 10-YEAR TREND FOR TOTAL ACRES AFFECTED IN WASHINGTON

Figure 17.



INSECTS | BARK BEETLES



Silver Fir Beetle

(*Pseudohylesinus sericeus* Mannerheim)

NATIVE

INSECTS | BARK BEETLES



Western Balsam Bark Beetle

(*Dryocoetes confusus* Swaine)

NATIVE

The silver fir beetle (SFB) and a related species, the fir root bark beetle (*Pseudohylesinus granulatus*), can kill true firs (*Abies* spp.) and other conifer hosts in Washington such as western hemlock and Douglas-fir. Pacific silver fir is the most frequently damaged host. Mortality during a typical year is scattered and attacks are focused on trees weakened by disease or attacked by other fir bark beetles. Outbreaks are rare but increases in population can occur following windthrow or landslide events that generate abundant breeding material.

Observers mapped approximately 3,500 acres in Washington with mortality caused by SFB in 2025, an increase from the 2,900 acres mapped in 2024. This was the highest level of SFB recorded by aerial survey since 2004, when 6,400 acres were affected. Very low amounts of mortality were recorded from 2005 until 2015, when levels began increasing to a recent peak of 1,700 acres in 2019. Concentrated areas with SFB mortality were mapped in 2025 in the North Cascades of central Whatcom County, east of Mt. Rainier in Pierce County, and near the Cascade crest northwest of Lake Wenatchee in Chelan County. This increase is despite the reduction in the acres surveyed. In 2025, only 75% of the forested area typically surveyed was completed (see page 6 for explanation).

Western balsam bark beetle (WBBB), often in conjunction with balsam woolly adelgid, is an important driver of subalpine fir mortality in high-elevation Washington forests. Observers mapped approximately 11,600 acres with WBBB-caused mortality in 2025, a small decrease from 12,500 acres in 2024. Though in 2025, only 75% of the forested area typically surveyed was completed, so actual acreage may be larger (see page 6 for explanation). The trend in subalpine fir mortality appears to be decreasing from a recent peak of 49,900 acres with damage in 2021, the highest level since 2007. The areas with the most concentrated damage were along the Cascade crest in Okanogan, Chelan, Klickitat, and Yakima counties. Areas affected in northeast Washington included high-elevation locations in the Colville National Forest in Ferry, Stevens, and Pend Oreille counties.



Silver fir beetle galleries.



Western balsam bark beetle killed fir.



INSECTS | AMBROSIA BEETLES

CREDIT: UDO SCHMIDT



Mediterranean Oak Borer

(*Xyleborus monographus* Fabricius)

NON-NATIVE

Recent Mediterranean oak borer (MOB) infestations of Oregon white oak in northwest Oregon increase the potential of this serious, non-native, forest insect pest moving into Washington. Native to Europe, North Africa, and western Asia, these tiny, one-eighth inch ambrosia beetles can tunnel into the wood of several western oak species, including Washington's only native oak: Oregon white oak.

Beginning in spring 2025, DNR deployed ethanol-baited funnel traps to monitor potential MOB introduction into Washington State. Traps were placed at 24 locations in 10 counties, ranging from Mason County south to Clark County and east to Klickitat and Yakima counties. A higher number of traps were placed in counties adjacent to Oregon. No MOB has been detected to date. Monitoring will continue in 2026.

The beetles do not eat wood but use it to grow fungi that are eaten by their young. Unfortunately, two of these fungi, *Raffaelea montetyi* and *Fusarium solani*, can result in wilting diseases that lead to branch and crown dieback. Reinfestation over several years can cause a top-down pattern of crown dieback and may eventually result in whole-tree mortality.

MOB was likely introduced into central California around 2010 and was reported to be killing valley oaks in Napa and Sonoma counties by 2019. California populations of MOB have spread to nearby Lake and Sacramento counties, where they have also been recorded in blue oak, California black oak, and Oregon white oak. MOB was first detected in traps in northwest Oregon's Multnomah County in 2018 and has since been collected in traps set in three other northwest Oregon counties: Clackamas, Marion, and Washington.

The public is encouraged to report suspected MOB sightings or related damage to oak trees in Washington at <https://invasivespecies.wa.gov/report-a-sighting/>



CREDIT: CHRISTINE BUHL / ODF

Crown dieback symptoms in Oregon white oak due to MOB infestation and wilting disease.

The first records of MOB infestation resulting in mortality of Oregon white oak occurred in 2022 near Troutdale in Multnomah County and Wilsonville in Clackamas County. Additional infested Oregon white oaks have since been found in both Multnomah and Clackamas counties.

More information about the situation in Oregon can be found in the Oregon Department of Forestry MOB factsheet: <https://tinyurl.com/MOB-oregon>

CREDITS: CHRISTINE BUHL / ODF (BOTTOM, MIDDLE), CURTIS EWING / CALIFIRE (TOP)



Diligence by the public to avoid moving firewood and other potentially infested oak materials is more important than ever.

The spread of MOB over wider areas in California and Oregon raises the concern that it will be difficult to eradicate or contain once established in new areas. The potential impact to Oregon white oak forests in the Pacific Northwest is not well understood. In its native range, oaks attacked by MOB are more likely to be unhealthy or stressed.

WHAT TO LOOK FOR: The most easily spotted symptom of possible MOB infestation is partial crown dieback that proceeds down to lower branches and the main stem over several years. Similar crown dieback symptoms can have other causes, such as drought stress or attack by oak pit scale and carpenterworm. More direct signs of MOB activity include piles of powdery white or tan frass on bark, perfectly round one-sixteenth inch wide entrance/exit holes through bark, and branching black-stained pinhole tunnels in wood that usually don't enter heartwood. Other ambrosia beetle species in oak will have similar signs, so adult beetle specimens are needed for positive identification.



Top: MOB adult.
Middle: MOB entrance hole.
Bottom: MOB galleries and staining in sapwood.

INSECTS | DEFOLIATORS

DANA BRENNAN / DNR



Douglas-fir Tussock Moth

(*Orgyia pseudotsugata* McDunnough)

NATIVE

No Douglas-fir tussock moth (DFTM) defoliation was recorded in Washington in 2025. The most recent outbreaks in Kittitas, Chelan, and Okanogan counties defoliated 1,900 acres in 2018 and 5,600 acres in 2019.

Established over 40 years ago, the interagency network of Early Warning System pheromone traps in eastern Washington continues to be annually monitored, but trap locations managed by federal agencies were not deployed in 2025. This was a 34% reduction in the number of trap sites monitored annually in eastern Washington, most of which were historically placed on federal and tribal lands. The remaining 158 locations were maintained by DNR staff in 2025.

The DFTM Early Warning System is a pheromone-based trapping system used to detect outbreaks of Douglas-fir tussock moth in the western United States. Each year, forest health specialists set out sticky traps baited with a synthetic version of the pheromone produced by female moths to attract male moths. These traps are retrieved after the male flight period, and the number of male DFTM moths are recorded. Increases in trap catch numbers may indicate outbreak events in the following years (Fig. 18).

Average trap catches across eastern Washington increased three-fold in 2025 compared to 2024. Areas with elevated trap catches included locations in Okanogan, Kittitas, Yakima, and Klickitat counties (Fig. 18). DFTM defoliation has not been recorded in Okanogan and Kittitas counties since 2019. Trap sites in Klickitat County have been steadily increasing recently and sightings of DFTM larva and egg masses were reported in this area in 2024 and

2025. Klickitat and Yakima counties do not have a recent history of tussock moth defoliation, however, the 2018-2019 outbreak in Kittitas County and south Chelan County also followed unusually high trap catches in an area with no historic precedent for DFTM defoliation. Larvae and egg masses were also observed in 2025 by DNR staff in Lincoln County near Grand Coulee.

High trap-catch numbers do not always correlate with the exact location of future defoliation, and high numbers can be associated with declining outbreak events. Outbreaks of DFTM in the Pacific Northwest are cyclical and occur approximately every 7-10 years from the first year with defoliation during the previous outbreak (Fig. 19). 2025 was year 7 on this cycle. With rising trap catches and recent observations of DFTM activity, eastern Washington is likely to experience outbreaks beginning in 2026 or 2027.

Left: DFTM cocoon near Grand Coulee in 2025; Right: DFTM egg mass near Grand Coulee in 2025.

DANA BRENNAN / DNR



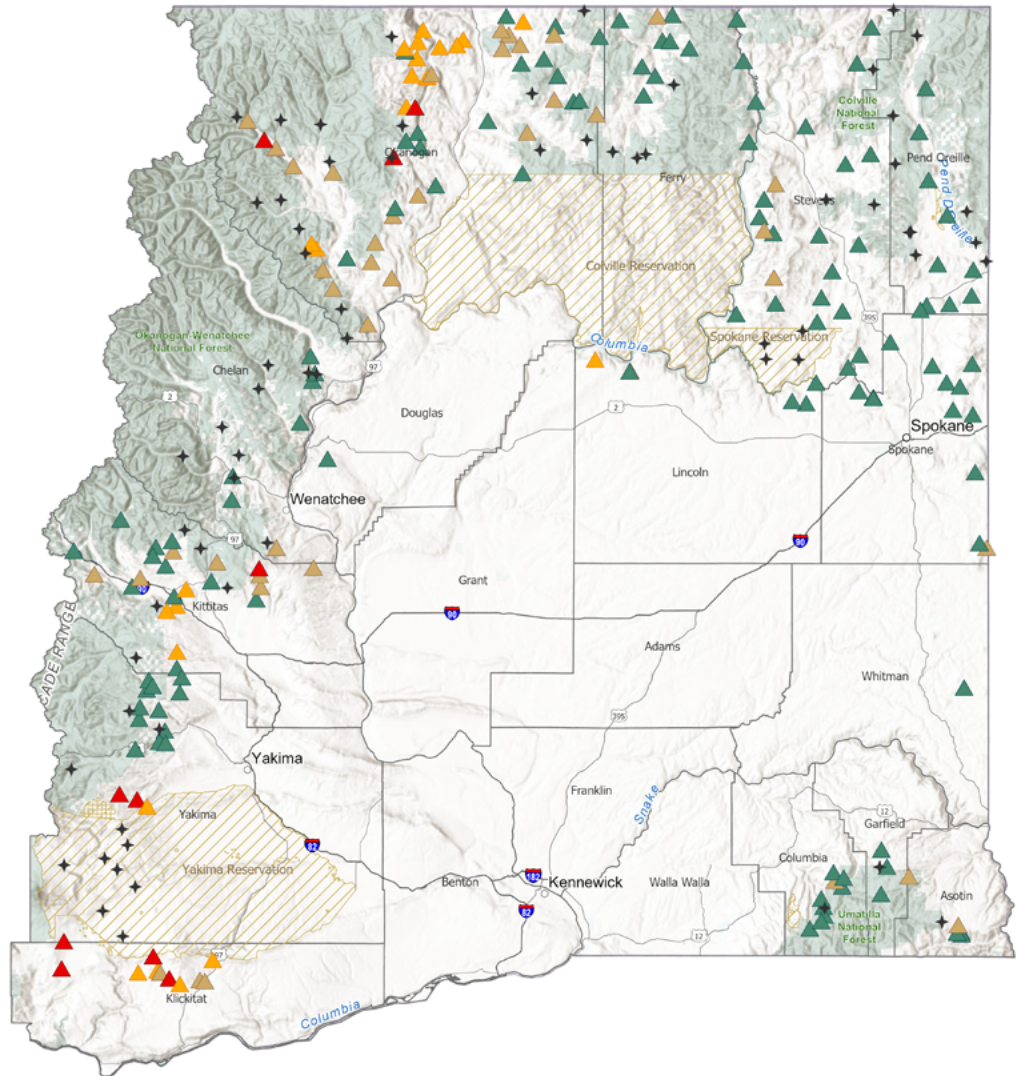
DANA BRENNAN / DNR

**Eastern Washington
is likely to experience
DFTM outbreaks
beginning in 2026
or 2027.**

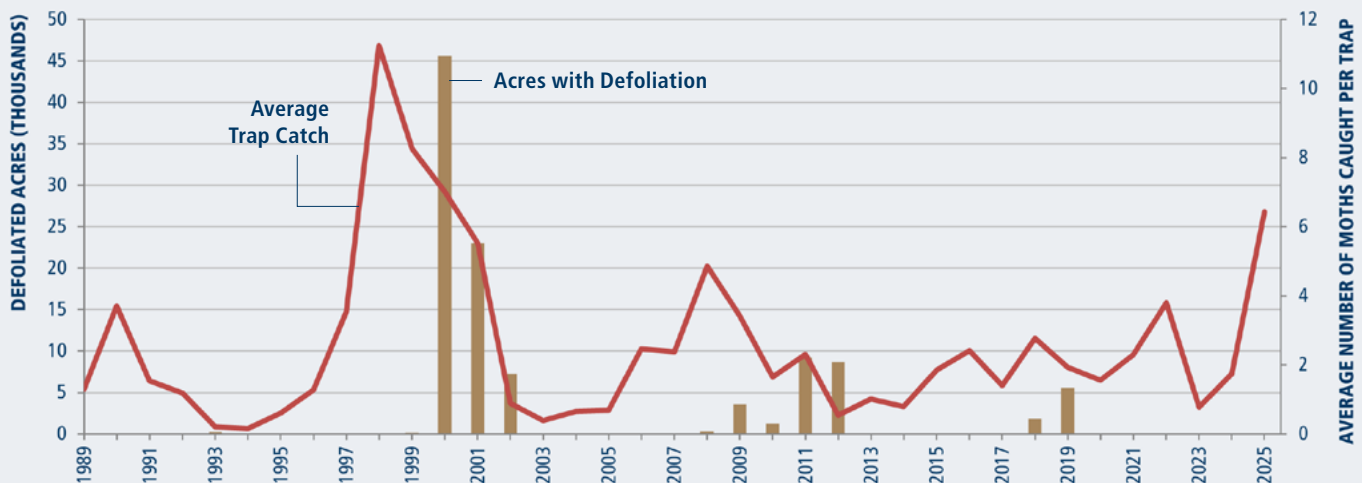
Figure 18.
**DOUGLAS-FIR TUSSOCK
MOTH PHEROMONE
TRAP CATCH
RESULTS IN EASTERN
WASHINGTON, 2025**

SOURCE: DNR

- ▲ <1 Moths
- ▲ 1 to 10
- ▲ 11 to 25
- ▲ 26 to 40
- ✦ Not sampled in 2025



**DOUGLAS-FIR TUSSOCK MOTH TRAP CATCHES AND DEFOLIATION
IN WASHINGTON 1988-2024** Figure 19.



INSECTS | DEFOLIATORS

CREDIT: MELISSA FISCHER / USFS



Western Spruce Budworm

(*Choristoneura occidentalis* Freeman)

NATIVE

Outbreak levels of western spruce budworm (WSB) defoliation continue along the Cascade Crest, with total acres of detectable defoliation mapped from the air in Washington jumping to about 149,200 acres in 2025. While 2025 aerial survey efforts were unfortunately unable to map all the forested areas of the state, the current outbreak area had decent coverage, illustrating a significant increase to the approximate 63,000 acres mapped in 2024, following zero acres mapped from 2021-2023 (Fig. 20).

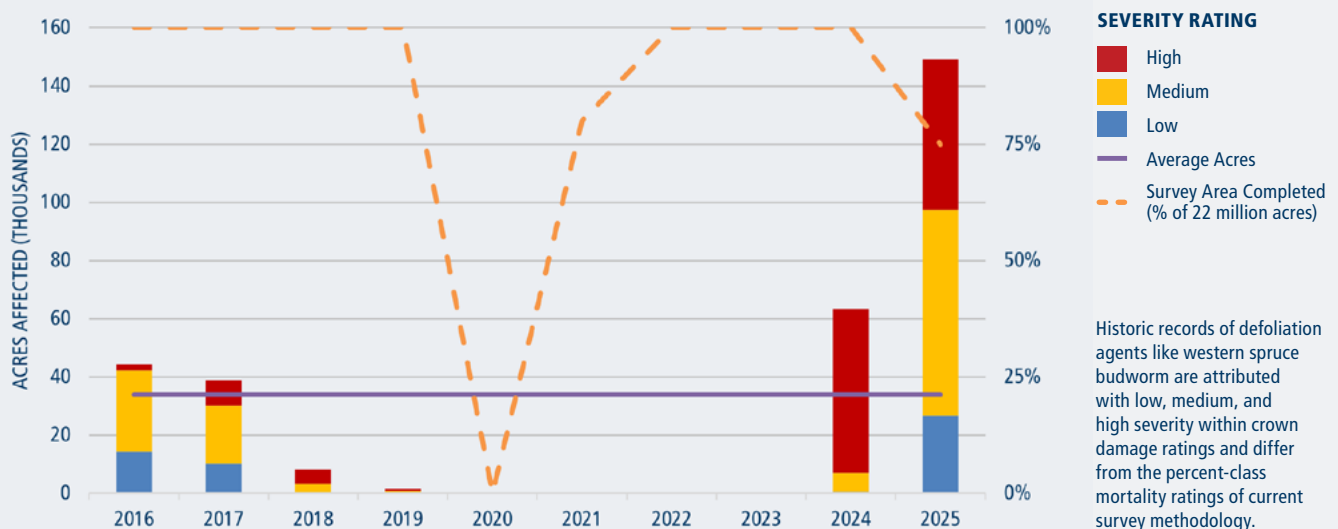
Outbreak-level defoliation continues in forests around Ross Lake in Whatcom, Skagit, and Okanogan counties, expanding east, west, and south to now include forests east and west of Lake Chelan in Chelan County (Fig 21). Acres mapped in 2025 were still lower than peak levels of over 500,000 acres when the last major WSB outbreak occurred in the central Washington Cascades in 2011 and 2012. A more recent, shorter-lived, and smaller outbreak in northeast Washington saw a notable decline in defoliated acres by 2019.

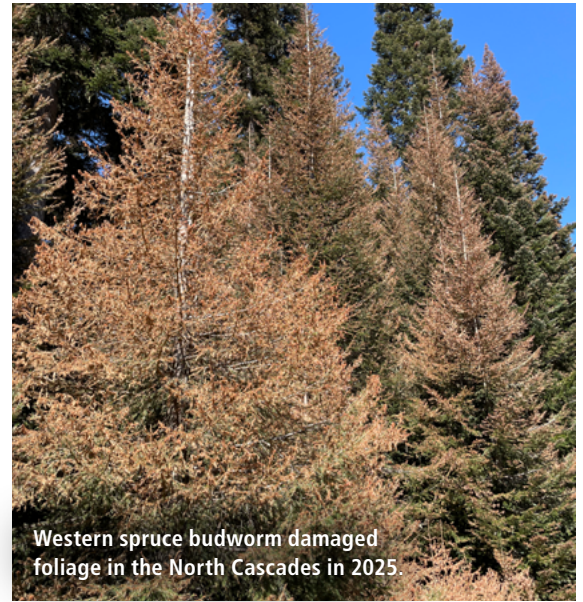
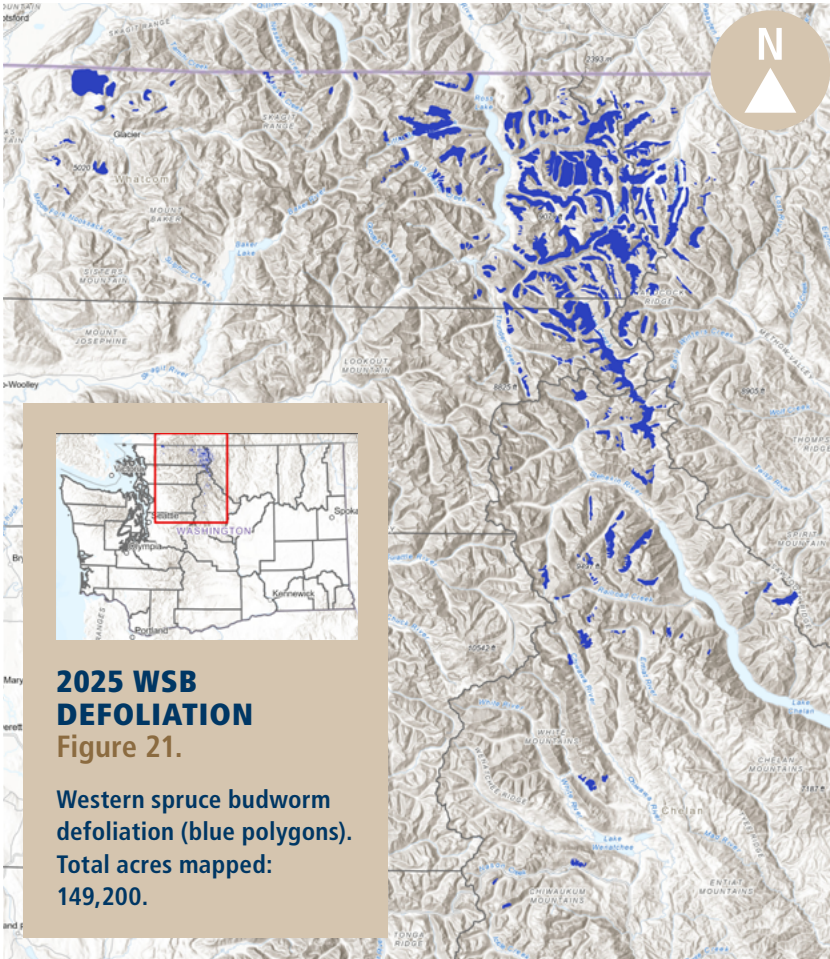
WSB defoliation also continued for the second year in high elevation forests of central Whatcom County around the Mt.

Baker area (Fig. 21). Outbreaks of WSB this far west of the Cascade crest are unprecedented. The damage was originally identified in 2024 as caused by western blackheaded budworm (*Acleris gloverana*), based on ground checks completed in the area too late in the season to collect more than just a few budworm specimens. As defoliation resumed in spring of 2025, larvae were abundant and sampling confirmed they were primarily WSB. Monitoring in this area will continue in 2026.

WSB pheromone traps were discontinued in 2024. Prior to this, traps were placed at 107 locations in northeast Washington, but after few trap sites from 2023 indicated the potential for defoliation in 2024, trapping efforts were paused. The purpose of WSB trapping is to predict the next year's defoliation severity in an area that is currently experiencing outbreak. Due to expense, time, and personnel commitments, traps were similarly not placed in 2025. DNR is not actively managing for budworm beyond silviculture prescriptions.

WESTERN SPRUCE BUDWORM 10-YEAR TREND FOR TOTAL ACRES AFFECTED IN WASHINGTON
Figure 20.







INSECTS | DEFOLIATORS

JON YUSCHOCK / BUGWOOD.ORG



Spongy Moth

(*Lymantria dispar* Linnaeus)

NON-NATIVE

Washington State Department of Agriculture (WSDA) deployed over 17,000 detection traps statewide to survey for the presence of all species and subspecies of spongy moth and the flighted spongy moth complex in 2025. Twenty-two adult male moths were collected in Western Washington. Molecular diagnostics confirmed all were the non-flighted subspecies of spongy moth, *Lymantria dispar*. Detections in 2025 indicate the presence of a persisting spongy moth population in King and Pierce Counties.

Eradication efforts are proposed for the spring of 2026 in Lakewood and an area west of Lake Youngs near Kent in response to sequential years of positive spongy moth detections. Post-treatment trapping in Skagit and Thurston counties will be conducted in 2026 for the third and final year of survey following WSDA's eradication activities in 2024. Eighteen high-density delimitation trapping response grids will be deployed in 2026 to monitor detection sites in Clark, Pierce, King, Skagit, Snohomish, Thurston, and Whatcom counties to determine the extent of possible spongy moth infestations in these areas.

U.S. Customs and Border Protection (CBP) intercepted multiple vessels in the Port of Tacoma and Port of Seattle in 2025 infested with flighted spongy moth egg masses. Flighted spongy moth poses a significant threat to Washington forests as they feed on an expanded number of tree hosts with a preference for conifers. Population increases in their native range account for the increased interceptions in Washington ports. WSDA staff participated in alternate life stage surveys in the fall of 2025 to inspect docks, rail, cranes, overhead lighting, Jersey barriers, and other structures including any ground vegetation for the presence of egg masses. Staff used inspection mirrors and binoculars to visually survey for the presence of egg masses or other alternate life stages; none were found. The spongy moth trapping survey will continue to target high risk ports and waterways in Washington in 2026 to detect any introduction of flighted spongy moth subspecies.

More information about spongy moths in Washington State, including survey results, treatment activities, and alternative life stage surveys can be found at www.agr.wa.gov/moths



Spongy moth adult.



Spongy moth caterpillar.

CREDIT: GYORGY CSOKA, HUNGARY FOREST RESEARCH INSTITUTE, BUGWOOD.ORG

CREDIT: JOHN GHENT, BUGWOOD.ORG

INSECTS | DEFOLIATORS

CREDIT: DANA BRENNAN / DNR



Douglas-fir Needle Midge

(*Contarinia pseudotsugae* Condrashoff and other *Contarinia* species)

NATIVE

Over 1,700 acres of Douglas-fir needle midge defoliation were mapped in Ferry, Stevens, and Pend Orielle counties during the 2025 aerial survey. Significant defoliation was also noted on the ground along Highway 395 near Loon Lake and between Boyds and Laurier, state Route 25 south of Kettle Falls, and Highway 20 near Dalkena. The damage was evident in all Douglas-fir on infested sites, regardless of size or age. There are likely additional areas where this is locally severe since only 75% of the forested area typically surveyed was completed in 2025 (see page 6 for explanation).

Douglas-fir needle midge is a native fly whose larvae feed in current year Douglas-fir needles. Defoliation results in discoloration, distortion, and slight swelling of affected needles. Although Douglas-fir needle midge is not typically a mortality agent, several consecutive years of defoliation can result in twig dieback and reduced tree vigor.



CREDITS: (ALL) DANA BRENNAN / DNR



Top right: Douglas-fir needle midge larvae as seen through a microscope.

Bottom right: Heavily infested Douglas-fir showing needle discoloration and distortion.

Above: Heavily infested Douglas-fir near Kettle Falls.



INSECTS | BRANCH AND TERMINAL INSECTS

CREDIT: CHRISTINE BUHL / ODF



Balsam Woolly Adelgid

(*Adelges piceae* Ratzeburg)

NON-NATIVE

Balsam woolly adelgid (BWA) is a non-native sucking insect that continues to be widespread in Washington and causes defoliation and sometimes mortality in subalpine fir, Pacific silver fir, and grand fir. The most significant BWA damage is in subalpine fir stands at high elevation. Observers mapped approximately 19,800 acres with damage in 2025, a decrease from the 30,300 acres mapped in 2024 and below the 10-year average of 31,900 acres (Fig. 22). Much of this decrease is likely due to a reduction in the acres surveyed. In 2025, only 75% of the forested area typically surveyed was completed (see page 6 for explanation).

The majority of BWA damage occurs on federal land. Damage, primarily to subalpine fir and Pacific silver fir, was recorded at high elevations in the eastern Olympic Mountains and in scattered high elevation areas east of the Cascades. BWA infestations are often chronic, and cumulative effects may result in mortality. BWA damage levels included approximately 2,800 acres with some host mortality in 2025.

Western balsam bark beetle (page 29) is another important mortality agent in subalpine fir stands that may attack trees weakened by BWA infestation. Approximately 11,600 acres in these same high elevation areas were mapped with some subalpine fir mortality caused by western balsam bark beetle.

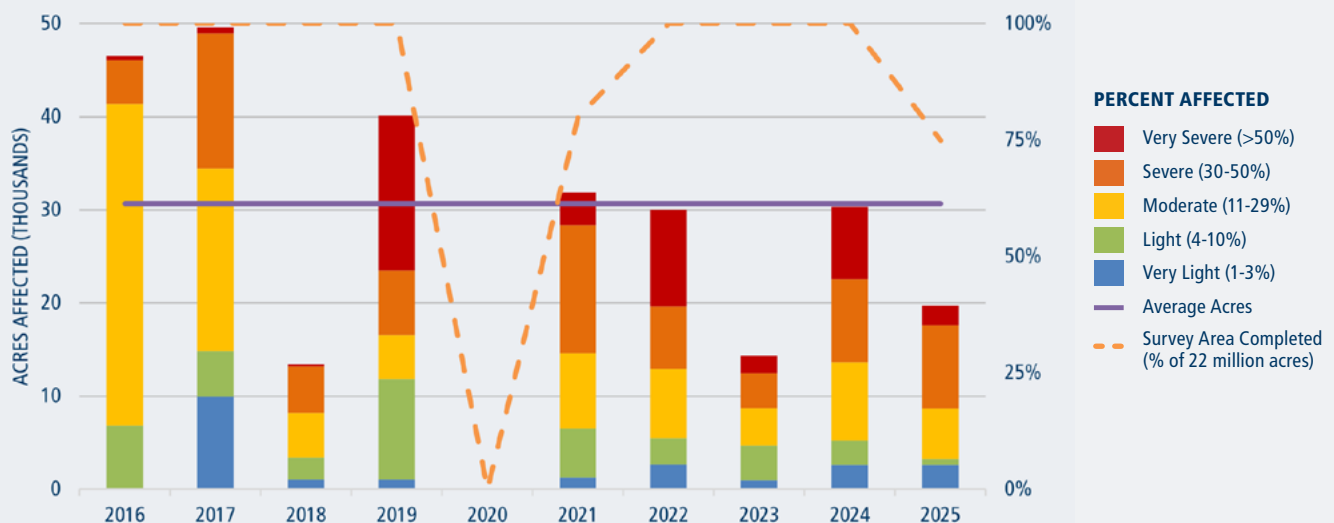


BWA
ovisacs on
fir bark.

CREDIT: RACHEL BROOKS / DNR

BALSAM WOOLLY ADELGID 10-YEAR TREND FOR TOTAL ACRES AFFECTED IN WASHINGTON

Figure 22.



INSECTS | WOOD BORERS

CREDIT: BENJAMIN SMITH

**Emerald Ash Borer***(Agrilus planipennis Fairmaire)***NON-NATIVE**

The emerald ash borer (EAB), a small metallic green wood boring beetle native to Asia, continues to pose severe threats to ash trees (*Fraxinus* spp.) across the United States and Canada. EAB has been recorded in 37 states and six Canadian provinces. First discovered in southeastern Michigan in 2002, the beetle burrows beneath the bark of ash trees and feeds on the phloem layer, leaving serpentine galleries that girdle and eventually kill the tree.

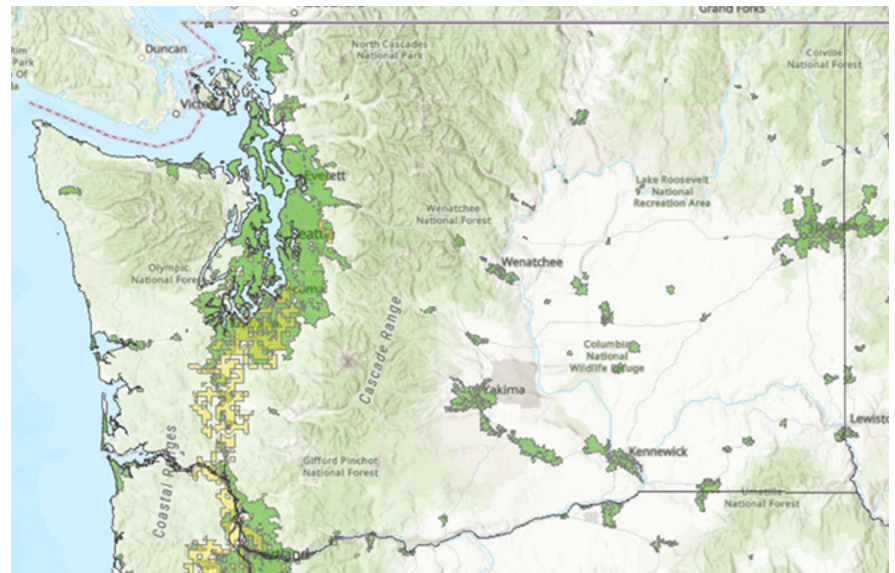
Common symptoms and signs of infestation include crown and branch dieback, galleries beneath the bark, and one-eighth-inch-wide D-shaped exit holes in the bark. With no examples of successful eradication anywhere in the US, management efforts focus on removal, replacement, and chemical treatments for significant or historic trees. Research is also underway to develop EAB-resistant ash trees using the genetics of “lingering ash” that survive infestations.

EAB has continued to expand its presence, with notable developments in 2025.

ASH DISTRIBUTION IN WASHINGTON STATE Figure 23.

SOURCE: USDA APHIS PPQ

- Ash - Local Scale
- Ash - Potential Urban Distribution

**New Detections**

- Multnomah County, Oregon: EAB was first detected in Washington County, Oregon in 2022. Since that time, detections have now been confirmed in four additional counties: Multnomah, Clackamas, Marion and Yamhill. One of the newest detections occurred in East Portland's Hazelwood neighborhood, demonstrating continued spread within the Portland metropolitan area and broader.
- Issaquena County, Mississippi: The Mississippi Forestry Commission announced the detection of EAB in Issaquena County in 2025, on the border with Louisiana.

Implications for Washington's Forests

Washington's native Oregon white ash plays an important ecological role in riparian forests, wetlands, and urban landscapes throughout western Washington. Loss of ash from these systems could significantly alter streamside habitats, reduce canopy cover of salmon bearing rivers, and impact native plant and animal communities that are reliant on these ecosystems.

While EAB has not yet been detected in Washington, ongoing monitoring, planning and community preparedness will be essential in reducing impacts when it eventually arrives.

CREDIT: DARIA GOSZYLA / DNR



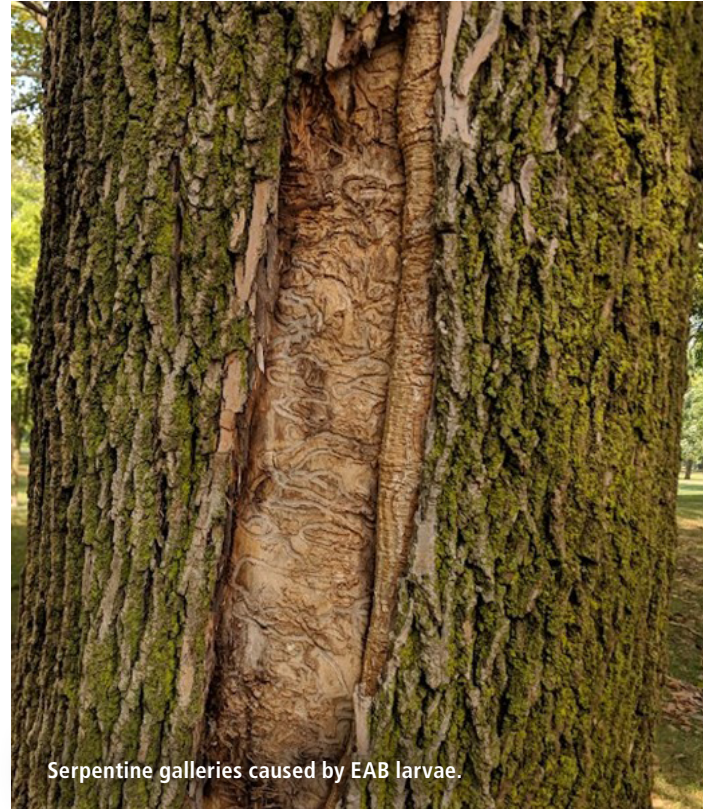
Residential neighborhood with ash street trees.



Washington DNR Preparedness Initiatives

Recognizing the imminent threat of EAB to Washington's ash resources, DNR proactively undertook several initiatives within the last year to support statewide preparedness:

- **Resource Planning:** DNR, the Washington Invasive Species Council (WASC), Washington Department of Agriculture (WSDA) and other state agencies are developing the Washington State Resources and Management Guide for Emerald Ash Borer. This guide will provide landowners and land managers with information to support decision-making related to ash treatment, removal, replacement and biological control options. The first draft of the guide was completed in December 2025, with a final version expected in 2026.
- **Pest Readiness Outreach:** the DNR Urban and Community Forestry Program, in partnership with the WASC hosted a pest readiness summit for municipal tree care staff in Puyallup in July 2025. While the summit addressed a range of pests, several presentations focused on EAB preparedness and introduced the Pest Readiness Playbook as a resource for communities.
- **Urban Tree Inventories:** Numerous new urban tree inventories have been funded through DNR's Community Forestry Assistance Grant Program. These inventories are crucial for helping cities and towns identify existing public ash trees and prepare for EAB impacts, enabling more strategic planning for management, removal, treatment and replacement (Figure 23).



Serpentine galleries caused by EAB larvae.

CREDIT: DARIA GOSZTYLA / DNR

Continued Vigilance and Public Participation

The continued spread of EAB underscores the importance of public awareness and vigilance, particularly in preventing the movement of firewood and other potentially infested ash materials. Everyone is encouraged to:

- **Recognize Symptoms:** Common signs of EAB infestation include crown and branch dieback, unusual leaf sprouting from trunks, serpentine galleries beneath the bark, and small D-shaped exit holes.
- **Report Sightings:** Suspected EAB sightings can be reported through the Washington Invasive Species Council's online portal. <https://invasivespecies.wa.gov/report-a-sighting/>
- **Avoid Planting Ash:** land managers and homeowners should avoid planting any new ash trees due to the high likelihood of future EAB impacts.
- **Do not transport firewood:** On February 20, 2026, the WSDA adopted chapter 16-476 WAC, establishing an exterior quarantine regulating the transportation of firewood into Washington. Firewood used for camping and heating can easily transport invasive pests across long distances. Purchase or collect firewood close to where it will be burned.
- **Prepare your community:** Communities can begin planning for EAB by developing a preparedness strategy using the Pest Readiness Playbook, <https://invasivespecies.wa.gov/projects/pest-ready/>



Ash tree with declining canopy, one sign of an EAB infestation.

CREDIT: DARIA GOSZTYLA / DNR

DISEASES | ROOT DISEASES

CREDIT: RACHEL BROOKS / DNR



Root Diseases

Caused by a variety of fungi

NATIVE

Common root diseases occurring within Washington forests are caused by native fungi and are a well-established part of our forested systems. These include Armillaria root disease (*Armillaria solidipes*); Heterobasidion root diseases (*Heterobasidion irregulare* and *H. occidentale*); and laminated root rot (*Coniferiporia sulphurascens*).

Root diseases are persistent in forests, where they often limit tree growth, cause tree mortality and failures, and limit successful regeneration of desired species. The canopy openings and snag creations that root diseases lead to may help diversify forest structure and vegetation composition. Root diseases are very challenging to manage and are typically considered “diseases of the site.” Correct identification of the specific root disease pathogen is important for determining effective management options.

Root rots are difficult to map during the aerial detection survey, as their signature is not easily seen from above. If mapped at all, they are often classified under associated categories, such as “young conifer mortality” or “Douglas-fir beetle” and not under root disease. For example, only 100 acres of root disease was mapped during the 2025 aerial detection survey, despite estimates that almost 2.8 million acres in Washington and Oregon combined are at risk of losing 15% or more of total basal area due to root disease between 2013 and 2027 (Krist et al. 2014, Lockman and Kearns 2016*).

Working in collaboration with USFS, DNR has been investigating root disease around Glenwood, an area well known for Armillaria root disease in ponderosa pine stands. Armillaria species are straightforward to identify as tree mortality causal agents. However, recent

observations including identifying conks and monitoring spore deposition rates, indicate that Heterobasidion root disease on ponderosa pine (caused by *H. irregulare*) is present in the area. The distribution and impacts of this pathogen in this area are currently not known but will be important to determine since management techniques differ between the two root disease species.

Root diseases continue to represent a large portion of site visits and questions posed to DNR’s forest pathologists and will remain a common management concern for Washington’s forests.

Left: Canopy opening caused by laminated root rot in western Washington.

Right: Basal resinosis (top) and mycelial fans visible where bark has been removed (bottom) on a western white pine killed by Armillaria root disease.

CREDITS: RACHEL BROOKS / DNR



CREDIT: DAN ONDAL / DNR

*<https://research.fs.usda.gov/treesearch/57824> & <https://research.fs.usda.gov/treesearch/50767>



DISEASES | CANKERS

CREDIT: RACHEL BROOKS / DNR



White Pine Blister Rust

(Caused by *Cronartium ribicola*)

NON-NATIVE

The non-native fungal pathogen *Cronartium ribicola*, the cause of white pine blister rust (WPBR), was accidentally introduced to North America more than 100 years ago. All nine species of white pine (five-needle pines) native to the US are highly susceptible to the disease, with mortality rates surpassing 90% in some areas. This pathogen is found throughout Washington where it has caused widespread mortality of our native western white pine and whitebark pine.

Western white pine is an important tree species in the Pacific Northwest as it once was a major timber tree and dominated many forest stands prior to being devastated by WPBR. Western white pine can contribute to tree diversification in management plans when certain root diseases are present. Whitebark pine is considered a keystone species in high alpine ecosystems, providing food and habitat for wildlife species and contributing to other ecosystem services such as snow retention and soil stability. It is now listed as threatened under the federal Endangered Species Act.

This disease is difficult to map during aerial detection surveys, as branch and stem cankers can cause slow dieback for many years before a tree succumbs to the disease, and full crowns may or may not turn red in a single year. If damage is mapped, it is often included with the mountain pine beetle codes for western white

pine and whitebark pine. This is because WPBR killed trees often turn red when they are killed by a low stem canker, similar to the symptom caused by mountain pine beetle.

In total, 200 acres with western white pine mortality and 1,300 acres with whitebark pine mortality were mapped in 2025 and coded as mountain pine beetle. WPBR, mountain pine beetle, and other pine bark beetle species can occur in the same stand and even on the same tree. Ground checks confirmed that the majority of 2025 mortality was driven by mountain pine beetle, though chronic WPBR is likely present and causing branch mortality, dead tops, and reduced cone and seed crops in most places. In addition to mature tree mortality mapped during ADS surveys, WPBR also impedes successful regeneration of white pines, as it can rapidly kill infected seedlings and saplings.

Natural genetic variation has fortunately provided some individual western white pine and whitebark pine lineages with varying degrees of resistance to the pathogen that causes WPBR. Breeding programs have been active for decades in efforts to take advantage of those variations. DNR, in collaboration with USFS, local tribes, and British Columbia, maintains 16 long-term research field sites focused on understanding the natural genetic resistance and variation found within western white pine and whitebark pine.

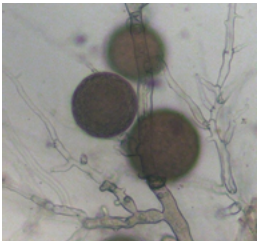
CREDIT: BETSY GOODRICH / USFS



Dead whitebark pine tops caused by WPBR stem cankers in central WA.

DISEASES | CANKERS

CREDIT: MARIANNE ELLIOTT / WSU



Sudden Oak Death

(Caused by *Phytophthora ramorum* Werres et al.)

NON-NATIVE

Phytophthora ramorum (Pr) is the causal agent of sudden oak death, ramorum leaf blight, and ramorum dieback. This water mold is invasive in North America and has caused extensive mortality of tanoaks and several other oak species in southwestern Oregon and California. Luckily, Oregon white oak, the only oak native to Washington, is not considered susceptible. Unfortunately, other native Washington plants and trees are susceptible, including western larch.

Damage akin to that caused by Pr in the forests of Oregon and California has not yet been observed in Washington. However, due to the presence of susceptible hosts, suitable climatic conditions, and occasional plant nurseries with Pr-infected stock, Washington's forests remain at risk for Pr spread and Pr-caused disease. This pathogen can move short distances via wind and wind-driven rain and can move long distances on nursery plant materials transported by humans.

DNR is proactively monitoring for Pr across the state. In 2025, 11 waterways in eastern Washington and one in western Washington were bait sampled for Pr using fresh rhododendron leaves. Selected eastern Washington sites were in watersheds that contained large numbers of western larch (two sites each in Pend

Oreille, Okanogan, Klickitat and Columbia counties and one site each in Spokane, Ferry, and Walla Walla counties). The western Washington site in Mason County was in an area with no known Pr presence in which rhododendron leaves for sampling were collected. Sites were sampled six times from March through June.

No stream sampling location in Washington tested positive for Pr in 2025. Overall, most sampled waterways (from 2006 to present) in Washington are free from Pr and there has been no indication to date that the pathogen is leaving waterways, as all vegetation samples collected in the woodlands bordering previously positive waterways have been negative for Pr.

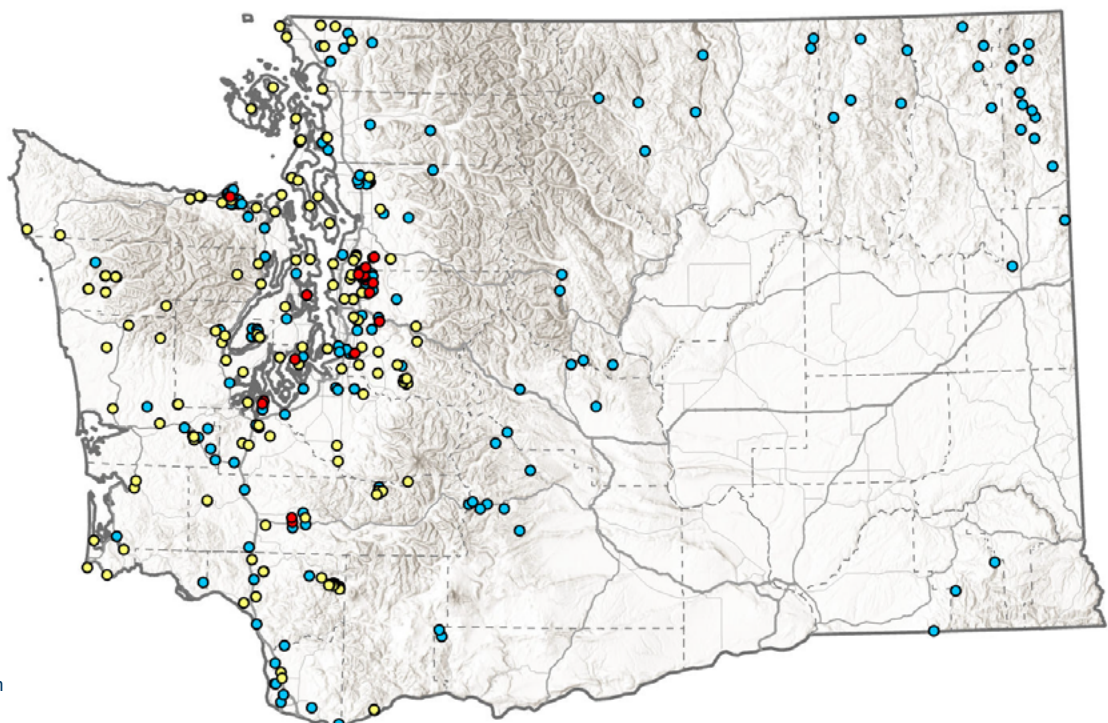
In collaboration with WSDA and WSU, next-generation sequencing laboratory techniques were used in 2025 to identify other *Phytophthora* species collected from streams during the 2024 survey. Several other *Phytophthora* species (not including Pr) as well as other Oomycete genera, were identified. While the absence of *P. ramorum* in these samples is welcome news, more research is needed to understand the roles and effects of other species identified. The results of this work demonstrate the value of these surveys, not only as a method of early detection, but also as a method to advance baseline understanding about the diversity of *Phytophthora* species in our watersheds.

Figure 24.

DNR PHYTOPHTHORA RAMORUM MONITORING, DETECTION, AND SURVEY SITES 2003 - 2024

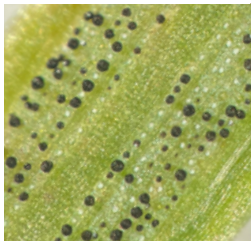
SOURCE: DNR

- Positive Aquatic Baiting Location
- Negative Aquatic Baiting Location
- Negative Wildland Survey Location



DISEASES | FOLIAR

CREDIT: RACHEL BROOKS / DNR



Swiss Needle Cast

(Caused by *Nothophaeocryptopus gaeumannii*)

NATIVE

The native fungus *Nothophaeocryptopus gaeumannii*, the causal agent of Swiss needle cast disease, is found wherever its only host, Douglas-fir, is located. This foliar disease can cause needle discoloration and premature foliage loss that may result in reduced tree growth. This pathogen became a priority in the coastal forests of Washington and Oregon in the late 1980s and has more recently become a concern in British Columbia. These areas have likely seen impacts due to the fungi-favorable topographic and climatic conditions (such as mild winters and wet springs), historical plantings using off-site seed sources, and increases in Douglas-fir numbers due to forest management practices.

Ground and aerial surveys monitoring this disease and its symptoms are currently conducted every other year (see the 2024 Forest Health Highlights report for recent results); both aerial and ground surveys in Washington are planned for spring 2026. The Washington State Legislature provided funding in the 2025 - 2027 biennium to monitor infection and damage trends in Washington's coastal forests. No surveys were completed in 2025.

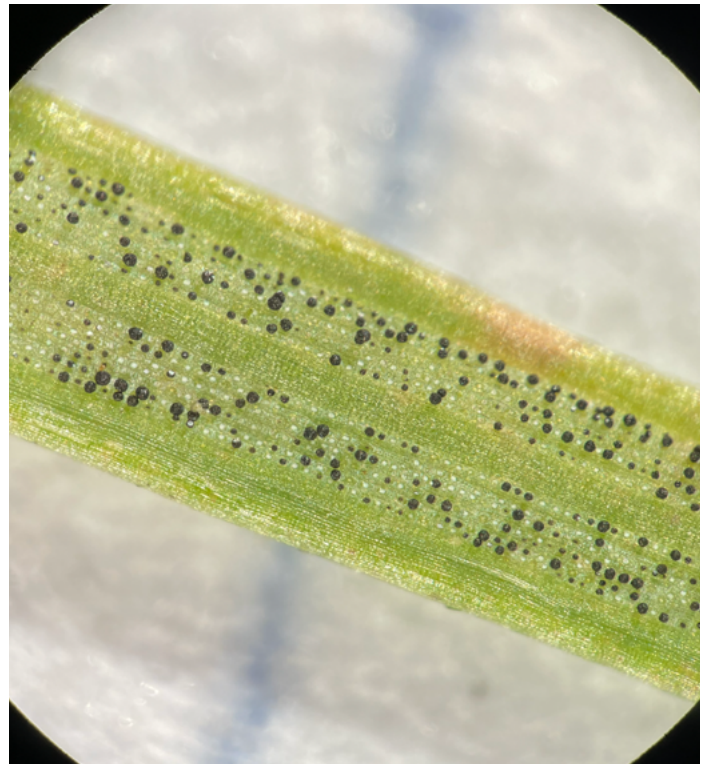
Recent survey results indicate no substantial increase in the severity of Swiss needle cast or the effect on Douglas-fir needle retention

and crown health over the past decade in coastal Washington. Additionally, since the correlation between fungal counts and needle retention is not always strong, it is important to consider other factors that may contribute to needle loss in Douglas-fir (such as weather, site quality, tree genetics, or other diseases and pests) when assessing a stand.

As always, site-specific ground surveys should be conducted in stands of concern before specific Swiss needle cast mitigation and management decisions are made. For a more detailed management discussion refer to the "Silvicultural decision guide for Swiss needle cast in coastal Oregon and Washington" available online at: extension.oregonstate.edu/pub/em-9352.

Left: A Douglas-fir crown with low needle retention.
Right: A microscopic view of the underside of a Douglas-fir needle showing stomata blocked by the SNC pathogen's fruiting bodies (black dots) and unobstructed stomata (white dots).

CREDITS: RACHEL BROOKS / DNR



PARASITIC PLANTS

CREDIT: RACHEL BROOKS / DNR



Dwarf Mistletoe

(Caused by *Arceuthobium* spp.)

NATIVE

Dwarf mistletoes are parasitic flowering plants that can reduce tree growth, deform branches and stems, and cause top-kill or even tree mortality. They are small plants with scale-like leaves and sticky seeds that disperse within a tree and from one tree to another. Mistletoe plants produce root-like sinkers that extend into a host tree's vascular system and then grow out from out of a tree's branches or stems. Most native conifers are affected by a native dwarf mistletoe in some part of their Washington range. Only western hemlock is impacted in western Washington, while in eastern Washington, firs, larch, Douglas-fir, pines, and hemlocks can be impacted. Larch dwarf mistletoe is often the most damaging agent of larch in eastern Washington.

Dwarf mistletoe is not mapped during the ADS, as tree mortality tends to be slow and therefore not visible from a plane. Mistletoe distribution is heavily influenced by tree species availability, density, and past forest management, so mistletoe abundance can vary significantly between stands. This is because some management actions may favor (such as uneven stand management) or disfavor (such as clear cutting) dwarf mistletoe spread and intensification. Site-specific ground surveys for mistletoes are required to assess their impact.

CREDIT: BETSY GOODRICH / USFS



Douglas-fir dwarf mistletoe crown symptoms on a hillside on Blewett Pass.

MULTIPLE DISTURBANCE AGENTS

CREDIT: BETSY GOODRICH / USFS



Western Redcedar Dieback

Approximately 10,000 acres with western redcedar (WRC) dieback and mortality were observed throughout Washington in 2025, a marked decrease from the 51,700 acres observed in 2024. Some of this decrease may be due to a reduction in the acres surveyed. In 2025, only 75% of the forested area typically surveyed was completed (see page 6 for explanation). Since aerial mapping of WRC dieback began in 2017, the affected area had increased every year to a recent peak of over 100,000 acres in 2022.

Symptoms of dieback include: thinning crowns, discoloration (yellowing or browning) of the needles, heavy cone crops, branch dieback and flagging, topkill, and mortality. The highest concentrations of damage in western Washington were in the Olympic National Forest, the Olympic National Park, and the foothills and mountain valley areas in Whatcom, Skagit, Snohomish, and King counties. WRC crown dieback has also been consistently observed across northeastern Washington.

Ground observations of WRC damage agents include cedar bark beetles (*Phloeosinus* species), wood-boring beetles, and root diseases, but these are typically secondary damage agents taking advantage of trees stressed by other inciting factors. Recent research on WRC dieback in the Pacific Northwest found that affected cedars experienced reduced growth for several years prior to dying or thinning. This indicates cumulative stress brought on by warmer and drier conditions in late spring and early summer, resulting in a longer-than-normal dry season, may be a factor leading to decline. Changing climatic conditions likely account for the wide range of damage observed throughout the region. Not all forests with WRC have experienced the same impacts and many healthy WRC remain, but future extreme drought and temperature events may lead to more dieback.

More information can be found here: <https://labs.wsu.edu/meddenslab/projects/western-redcedar-mortality/> and <https://storymaps.arcgis.com/stories/1405dab5f59246aa83849ec43f72b15a>



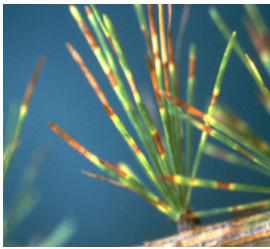
Thinning and mortality of WRC in Skykomish.

CREDITS: BETSY GOODRICH / USFS



MULTIPLE DISTURBANCES

CREDITS: JOHN W. SCHWANDT / USFS & BUGWOOD.ORG



Larch Needle Cast

(Caused by *Rhabdochline laricis*)
NATIVE



Larch needle tips fed on by the larch casebearer.

CREDITS: RACHEL BROOKS / DNR

CREDITS: (TOP) RACHEL BROOKS / DNR



Larch Needle Blight

(Caused by *Hypodermella laricis*)
NATIVE

CREDITS: CONNECTICUT AGRICULTURAL EXPERIMENT STATION



Larch Casebearer

(*Coleophora laricella*)
NON-NATIVE

A variety of fungi and insects impact larch foliage in Washington, including: one non-native insect (the larch casebearer) and two native fungal diseases (larch needle cast and larch needle blight). Aerial detection survey observers mapped larch defoliation on approximately 1,600 acres in eastern Washington in 2025, a notable decrease from the 28,000 acres mapped in 2024. Larch defoliation numbers vary each year, but some of this decrease may be due to a reduction in the acres surveyed. In 2025, only 75% of the forested area typically surveyed was completed (see page 6 for explanation). There are areas throughout eastern Washington where larch defoliation can be locally severe that were not covered by the 2025 ADS.

Differentiating between these three agents causing larch defoliation can be challenging when mapping from the air, and the agents may co-occur on single trees when verified in ground checks. Staff received reports of larch defoliation in southeastern Washington in the Blue Mountains, which was confirmed to be

mostly larch casebearer, though larch needle blight was also observed.

The two native fungi which cause larch needle blight and larch needle cast can be differentiated by their impacts on larch foliage. Larch needle blight kills entire whorls of foliage in the spring, which are then retained on the branch throughout the year even as larch re-foliates. Black elliptical fruiting bodies can be observed on the needles later in the season. Larch needle cast will infect single needles, causing discolored spots or bands near the middle or tip of the needle expanding outward, and these needles are shed during the summer months. With both pathogens, heavy infection can give trees a reddish-brown appearance. Areas where these fungi are locally severe are typically driven by cool, moist spring weather during larch bud break that favors fungal infections.

The invasive larch casebearer moth is another agent responsible for larch defoliation throughout eastern Washington, causing a wilted or shriveled appearance on impacted needles. Heavy infestations can include one-quarter inch long, cigar shaped larval cases attached to needle whorls, a sign that can be used to differentiate from foliar diseases.

Crown loss from all three of these agents can impede seasonal tree growth, and small trees or those repeatedly affected for multiple years can be killed. While local impacts can be severe, significant mortality or long-term impacts of these defoliating agents on forest stands are usually minimal, even in years with high levels of discoloration observed. This is due in part to the deciduous habit of larch, which sheds needles and re-foliates each spring.

CREDITS: DANA BRENNAN / DNR



Larch needle blight and larch casebearer symptoms near Northport.

MULTIPLE DISTURBANCES

CREDITS: JUSTIN HOF / USFS



Young Conifer Mortality

Aerial surveys record scattered, pole-sized, newly dead trees of all conifer species as “young conifer mortality.” Based on ground checks, girdling of tree stems by bears and root diseases are the primary causes of this distinct damage pattern. Drought, secondary bark beetles, and other cambium-feeding animals such as porcupines and mountain beavers, may also play a role. This damage signature is commonly identified in young timber stands in western Washington but can be present throughout all forest types.

Bears emerging from hibernation in spring may strip bark from trees and feed on the sugary layer beneath. Trees are either entirely girdled and killed, or they become weakened and vulnerable to secondary damage agents. While this behavior is quite common, our ability to detect and record the mortality varies, as the time it takes the tree to die and its needles to turn red differs based on the season’s precipitation, temperature, availability of other bear food sources, and tree age.

Root disease damage (see the root disease section for more details) manifests in a similar pattern in young conifer stands with scattered dead trees. Ground inspection of trees can easily determine if the bark has been stripped by bear or if additional investigation into root rot or other stressors should be completed.

Approximately 57,400 acres with young conifer mortality were observed in 2025, similar to the 53,800 acres observed in 2024 but less than the 87,700 acres observed in 2023. This acreage is within previous recorded ranges and is not unusual. This increase is despite the reduction in the acres surveyed. In 2025, only 75% of the forested area typically surveyed was completed (see page 6 for explanation).

CREDITS: BETSY GOODRICH / USFS

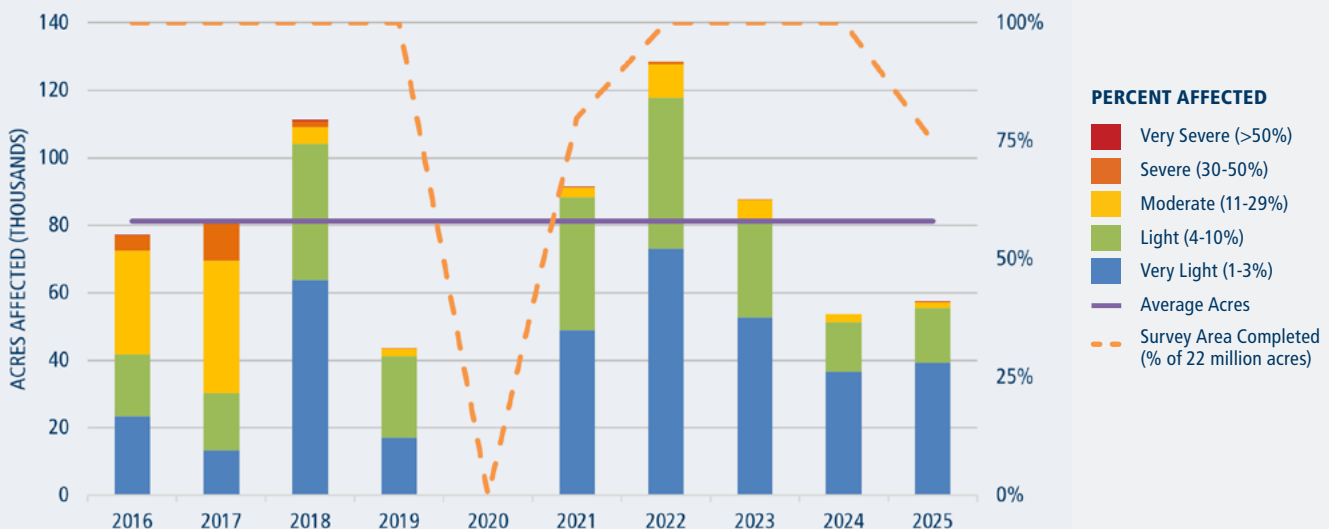


Bark stripped by a bear.

MULTIPLE DISTURBANCES

YOUNG CONIFER MORTALITY 10-YEAR TREND FOR TOTAL ACRES AFFECTED IN WASHINGTON

Figure 25.



ADDITIONAL UPDATES

Washington's Forest Action Plan

2025 Forest Action Plan

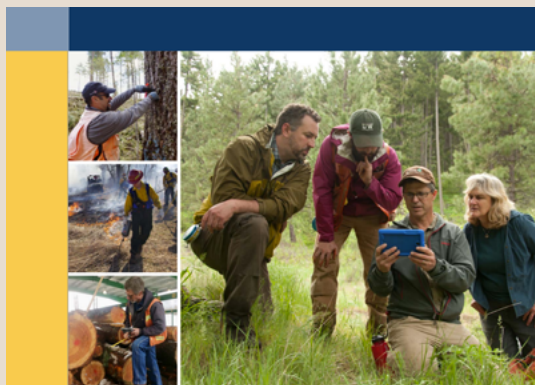
Washington's 2025 Forest Action Plan provides a comprehensive roadmap for conserving, restoring, and sustaining forests across all lands. Developed by the DNR in collaboration with Tribes, federal and local agencies, private landowners, and community partners, the Forest Action Plan establishes a shared strategic framework to address the most pressing threats facing Washington's forests while supporting the ecological, economic, and social benefits forests provide.

The Forest Action Plan is required under the 2008 Farm Bill and enables Washington to access federal Cooperative Forestry funding administered by the USDA Forest Service. Cooperative Forestry programs, including Forest Health Protection, provide critical financial resources to support insect and disease monitoring and technical assistance to landowners and communities.

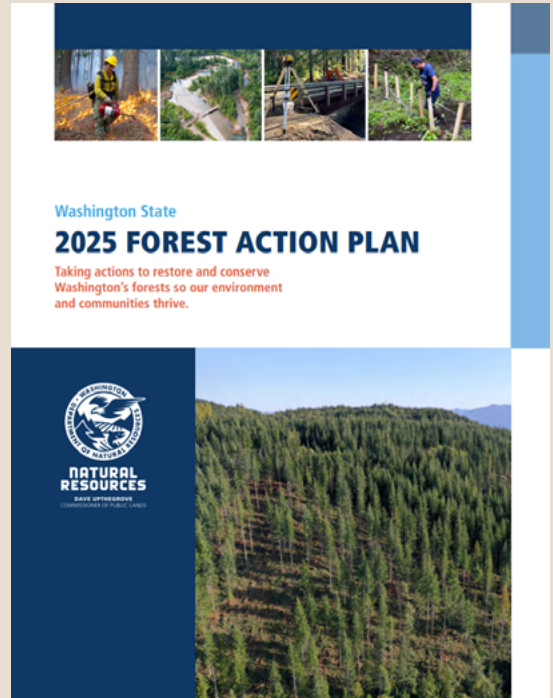
Plan Revision: A Renewed Commitment to Washington's Forests

The 2025 revision of the State Forest Action Plan builds on the foundation established in the 2020 Forest Action Plan and reflects five years of progress, new scientific information, and extensive engagement with partners and stakeholders across the state. The updated plan reassesses forest conditions, evaluates progress against existing goals, and establishes updated priorities and actions to guide forest management, conservation, and wildfire preparedness efforts through 2030.

The 2025 Forest Action Plan serves as the state's overarching forest resilience strategy, integrating and aligning multiple major planning efforts under a unified vision. These include the 20-Year Forest Health Strategic Plan: Eastern Washington, the recently completed Western Washington Forest Health Strategic Plan, and the Wildland Fire Protection 10-Year Strategic Plan. By bringing these complementary strategies together, the Forest Action Plan helps ensure that investments and actions are coordinated across ownership boundaries.



20-YEAR FOREST HEALTH STRATEGIC PLAN EASTERN WASHINGTON



The plan maintains a strong focus on priority planning areas and landscapes where coordinated, cross-boundary investments can achieve the greatest impact. It also reinforces the state's commitment to science-based decision-making, climate adaptation, community wildfire preparedness, and equitable engagement with Tribes, landowners, and rural communities.

Advancing Forest Health in Eastern Washington

Implementation of the 20-Year Forest Health Strategic Plan: Eastern Washington continues to guide restoration and wildfire risk reduction across the state's dry, fire-prone forests. Since its adoption, the plan has provided a science-based framework to prioritize treatments identified as most in need of restoration.

DNR and partners have made significant progress in implementing this strategy. The plan's landscape evaluation framework informs where and how treatments are implemented by integrating data on wildfire risk, drought vulnerability, and forest conditions.

Since 2017, 589,520 acres of density reduction and surface fuel treatments have been completed in 45 forest health priority planning areas in eastern Washington. These treatments include reported forest health treatments, satellite-detected forest management activities and low to moderate severity wildfire. Ongoing monitoring and the Work of Wildfire assessments provide valuable feedback on how forests are responding to wildfire.

Completing the Western Washington Forest Health Strategic Plan

In 2025, DNR finalized the Western Washington Forest Health Strategic Plan, marking a major milestone in expanding the state's forest health strategy to include the unique forest ecosystems west of the Cascades. While western Washington forests differ significantly from eastern Washington's dry forests, they face their own set of challenges, including increasing drought stress and significant development pressure.

The Western Washington plan provides a region-wide, science-based assessment of forest conditions and identifies strategic priorities to improve forest resilience in westside forests. The plan emphasizes the importance of climate-informed management, maintaining working forests at risk of development, and targeted fuel reduction in areas where wildfire risk threatens communities and critical infrastructure.

Together, the eastern and western Washington forest health strategies provide a comprehensive, statewide framework for improving forest resilience across diverse forest types and ownerships.

Integrating Wildfire Preparedness and Forest Resilience

Wildfire preparedness and response remain central components of the Forest Action Plan. The plan integrates priorities from the Wildland Fire Protection 10-Year Strategic Plan, which focuses on creating resilient landscapes, fire-adapted communities, and ensuring safe and effective wildfire response.

The Forest Action Plan recognizes that proactive forest management and community preparedness are essential to reducing wildfire risk and protecting public safety. Investments in forest restoration, fuel reduction, and community resilience help reduce the severity of wildfires and protect homes and critical infrastructure.

By aligning forest restoration and wildfire preparedness strategies, the Forest Action Plan helps ensure that forest health and wildfire investments advance our goals related to landscape resilience, community wildfire preparedness, and safe and effective fire response.

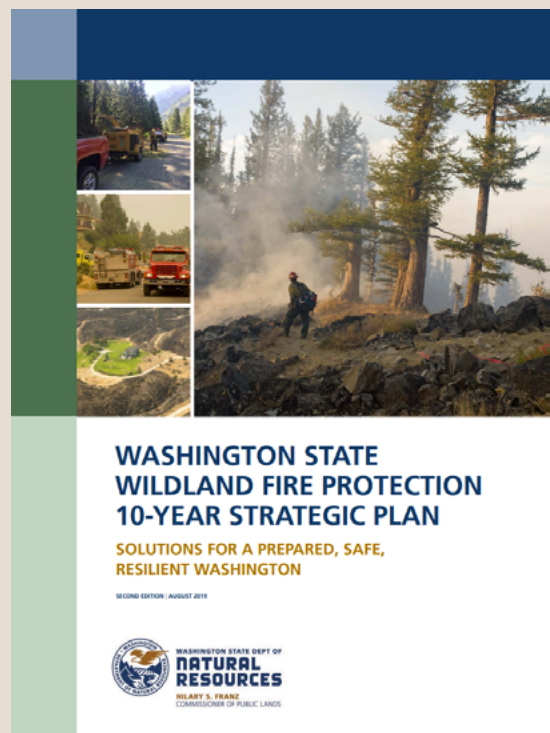
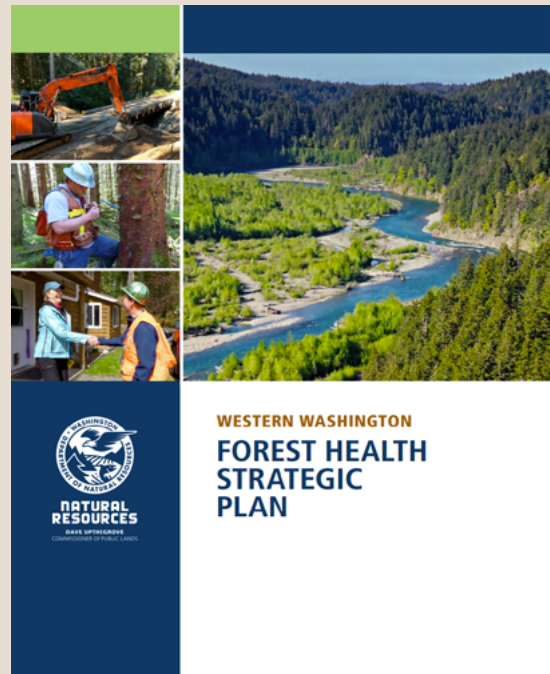
Looking Ahead

The 2025 Forest Action Plan reaffirms Washington's commitment to sustaining healthy, resilient forests for current and future generations. The Forest Action Plan ensures continued access to critical federal funding that supports DNR's Cooperative Forestry programs including Forest Health Protection. These investments enable DNR and its partners to monitor forest conditions, respond to emerging threats, and implement restoration and wildfire preparedness projects across the state.

Full Reports Available

The following reports are available online.

- 2025 Forest Action Plan: https://dnr.wa.gov/sites/default/files/2026-01/rp_2025_forest_action_plan.pdf
- 20-Year Forest Health Strategic Plan, Eastern Washington: https://dnr.wa.gov/sites/default/files/2025-03/rp_forest_health_20_year_strategic_plan.pdf
- Western Washington Forest Health Strategic Plan: https://dnr.wa.gov/sites/default/files/2026-01/rp_western_washington_strategic_plan.pdf
- Washington State Wildland Fire Protection 10-Year Strategic Plan: https://dnr.wa.gov/sites/default/files/2025-03/rp_wildfire_strategic_plan.pdf





AERIAL DETECTION SURVEY METHODOLOGY

The Aerial Detection Survey is a complex, landscape-scale forest health monitoring effort that balances rapid data collection with biological expertise. Occasional errors in identifying causal agents or geographic placement are expected. Survey aircraft travel at high speeds at varying altitudes; subtle or overlapping forest damage may be overlooked, particularly in areas with complex disturbance patterns. The program's overarching objective is to correctly identify and map forest damage within ¼ mile of its true location at least 70% of the time. Below is a structured breakdown of the methodology, technical specifications, and data interpretation protocols.

SURVEY OVERVIEW

Since 1947, the USFS Pacific Northwest Region and DNR have cooperatively monitored forest health conditions across all 22 million acres of Washington forestland using fixed-wing aircraft.

- Aircraft: Fixed-wing aircraft capable of sustained flight (3-4 hours) at low speeds.
- Flight pattern: A systematic 4-mile grid at an average velocity of 120 mph.
- Altitude: Averages between 500 and 3,500 feet above the forest canopy.
- Personnel: Two specialists scan forests from either side of the plane, covering the area directly below and up to 2 miles beyond the aircraft.
- Accuracy goal: To map damage within 1/4 mile of its precise location 70% of the time.
- Experience Requirement: At least one of the two observers must have a minimum of three years of regional mapping experience to ensure data integrity.

MAPPING & DAMAGE SIGNATURES

Surveyors use a program called Digital Mobile Sketch-Mapping (DMSM), software developed by the USFS, on handheld tablet computers to record forest disturbance observations in real-time.

Identification: Specialists distinguish current year dead, declining, or defoliated trees from one another and determine the likely causal agent based on associations from an array of learned damage signatures. Geographic location, stand composition, and crown shape play a significant part in identifying tree species from an aerial perspective. Foliage density (e.g., inner versus outer crown thinning) and tree size can indicate the most likely type of damage causal agent. Vivid foliage colors (e.g., brick red, unmistakable oranges, mustard yellows, etc.) help surveyors distinguish between a handful of bark beetle species known to kill trees quickly, so their crowns change color in less than a year. Many

agents cause damage in characteristic ways, patterns such as tight clusters of dead trees, scattered dead, or landscape-wide mortality. Together, these signatures allow survey specialists to make rapid, educated assessments of host and the most likely primary causal agent.

Data Types:

- Polygons: Large swaths or groupings of damage over 2 acres in size are outlined with a stylus and assigned a severity rating based on the amount of damage observed within a given polygon (Table 4).
- Points: Small clusters of damage, 30 trees or less and under 2 acres in size are marked by single taps of a stylus and assigned a point-class code based on number of affected trees observed (Table 5).

Damage extent versus severity and the percent-class rating:

- It is a common misconception that every tree within the boundary of a polygon is affected by the attributed agent. To interpret aerial survey data correctly, it is important to understand the difference between extent and intensity. Polygons represent the geographic distribution (extent) of a given damage agent, while the percent-class rating attributed to a polygon denotes the scale (intensity) of damage within that area (Table 4).
- All polygons are assigned one of five incremental percent-class ranges representing the percentage of the treed area affected by the damage agent within that polygon. The total treed area used as a denominator for the percentage estimate includes all live, dead, damaged, and non-host species within the polygon.

- For defoliation damage polygons, an additional within-crown severity rating is also assigned, representing the observed intensity of defoliation within tree crowns throughout the polygon: L (light) for <50% of leaves defoliated, M

(moderate) for 50-75% defoliation, or H (heavy) for >75% defoliation.

WILDFIRE PROTOCOL

Wildfire damage often mimics insect or disease damage signatures. To maintain data accuracy:

- 3-year rule: Areas affected by wildfire are disregarded for sketch-mapping until three years post-event.
- Visual aids: Fire perimeters from the previous 3 years are displayed on DMSM tablets to help surveyors exclude these areas while mapping.

DATA ACCESSIBILITY

USFS GIS datasets use percent-class ratings for polygons and point-class codes for points. DNR GIS datasets use trees per acre (TPA) values as intensity modifiers calculated from the percent-class rating assigned at the time the data was collected. The purpose of this is to integrate new ADS data into DNR's historical dataset as survey methods transitioned from TPA to the percent-class system in 2018.

Table 4. Percent of treed area affected classes used for ADS damage polygons

PERCENT-CLASS CODE	NAME (VALUE RANGE)
1	Very Light (1-3%)
2	Light (4-10%)
3	Moderate (11-29%)
4	Severe (30-50%)
5	Very Severe (>50%)

Table 5. Range classes of individual affected tree counts used for ADS damage points

POINT-CLASS CODE	NUMBER OF TREES AFFECTED (VALUE RANGE)
1	1
2	2 – 5
3	6 – 15
4	16 – 30
5	>30

DATA AND SERVICES

Forest disturbance events in Washington are documented annually through aerial surveys, providing a comprehensive assessment of forest health conditions statewide and contributing to a nearly 80-year historical record. Disturbances – categorized as tree mortality, disease, or defoliation – are evaluated based on their geographic extent and severity. The Forest Health Aerial Detection Survey (ADS) program in the Pacific Northwest is administered cooperatively by DNR and the USFS, Region 6 FHP. The data generated supports federal, state, private, and tribal partners in guiding contemporary forest management decisions. Compared to alternative survey methods that require significantly more time and labor, ADS remains the most cost-effective approach for collecting regional and statewide forest health information. All digital resources and raw datasets produced by aerial survey specialists are publicly available and serve as valuable tools for assessing local forest disturbance events and informing responsible management of affected trees. The interagency ADS program also maintains an archive of survey data dating back to 1947, enabling users to analyze long-term trends in forest damage across Washington.

PDF MAPS AVAILABLE FOR DOWNLOAD

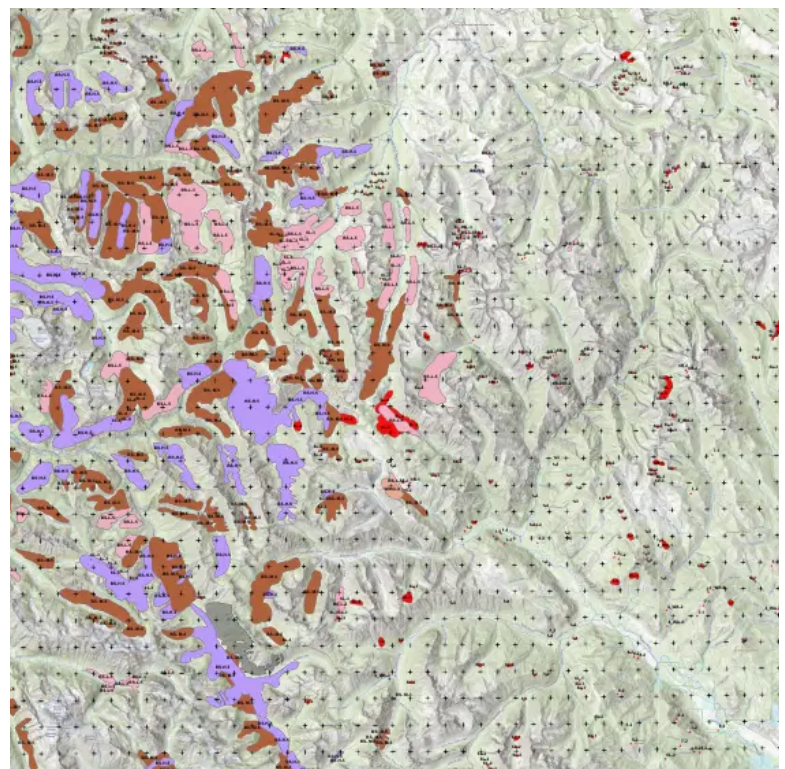
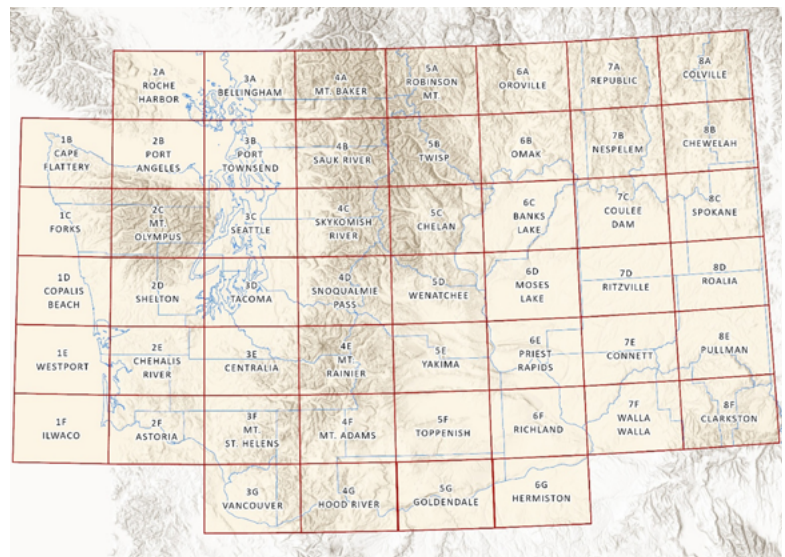
Aerial survey data from 2022 to 2025 are available in a series of PDF quadrangle maps at: <https://www.fs.usda.gov/r06/natural-resources/forest-health/aerial-detection-survey>. Each “quad map” is georeferenced, allowing the user to view their location when using a mobile device equipped with a compatible PDF map-viewing application (e.g., Avenza). This function works with or without a network connection, meaning the user’s current location can be viewed offline.

To access ADS quad maps, head to the link above. Select “Georeferenced Quad Maps.” A new page will open with a list of years to choose from. Once selected, a subfolder of downloadable PDF files will appear. Each file name concludes with a 2-digit code, a number and a letter. Use the reference map to the right to determine the 2-digit quad code that encompasses an area of interest (e.g., 5A ROBINSON MT.).

Scroll through the “next/previous” buttons at the bottom of each folder to find relevant quad code(s). Select the file for a preview of the PDF quad map. Click “Download” in the top right corner to download the quad. Damage polygons are colored according to damage type and labelled with shorthand damage agent codes that are defined in the legend below the map. Each code is followed by a number and/or letter indicating the damage severity class (Tables 4 and 5, page 50) and/or the intensity of crown defoliation (L – light, M – moderate, H – heavy) within each polygon or point. Observed damage codes are listed in the legend at the lower lefthand side of the quad map.

Top: Designated name and corresponding 2-digit code of each quadrangle in Washington.

Bottom: A section of Quadrangle map 5A, 2025. Primary damage agent: Western spruce budworm. Aerial detection surveys, 2022-2025, are available for download on the USFS ADS website (link above). Quad maps are georeferenced for use with compatible, geolocating mapping software. Observations of forest disturbance categorized by color and shorthand code are defined in the map legend.





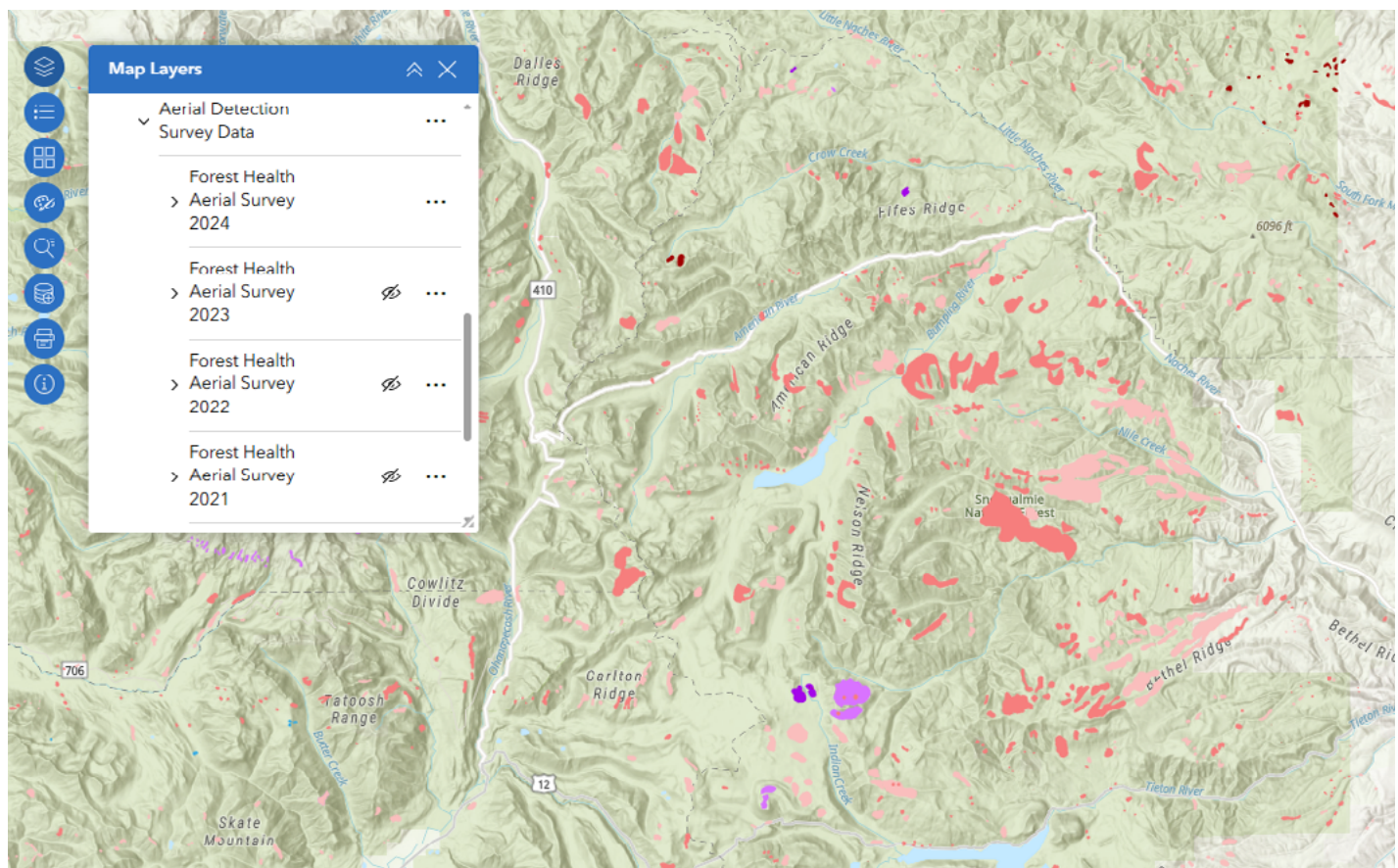
INTERACTIVE MAP TOOLS

There are a few locations where you can access ADS online in interactive maps, both through DNR and USFS websites:

■ **DNR Forest Resilience and Mapping System.** This GIS based mapping service displays Washington aerial survey data from 2015 through 2025 along with a host of other data layers produced by the agency. Directions to view aerial survey data: In a web browser, search “wadnr forest resilience and mapping system” and select the link beneath the heading “ArcGIS Online” or go to <https://experience.arcgis.com/experience/4f3323f1a82b418d9dbf16faf32dd9f2>. On the following webpage, navigate to the dialog box titled “Map Layers” near the left edge of the map. Hover the cursor over the top layer. When the eye icon appears, unselect it. This toggles the visibility of each layer on the map. Do the same for each layer in the dialog box except for the one titled “Monitoring.” This step prevents non-ADS datasets from generating in the map output and improves the functionality of the tool. Click the angle bracket symbol (“>”) next to the “Monitoring” tab to view all the data layers nested within. Toggle off every layer except for “Aerial Detection Survey Data.” Click the angle bracket next to “Aerial Detection Survey Data” to view all selectable aerial survey data layers, 2015 through 2025. Zoom in to a location of interest and select any polygon to display the host species and damage agent attributed to that observation.

■ **USFS Current Year Data Viewer.** The USFS offers an alternative web service that allows the user to view current year aerial survey data and flightlines the moment they are uploaded to the GIS host server, allowing the user to track survey progress throughout the summer. Those viewing or referencing the data within this map should note that it is considered draft data and subject to change by the end of the survey season. To access this map, visit <https://www.fs.usda.gov/r06/natural-resources/forest-health/aerial-detection-survey>. Navigate to the center of the webpage and click the link titled “Current Year Data Viewer.” If you are prompted to read and agree to specific terms, select “OK.” Directions on how to use this tool are located on the lefthand side of the map. Use the green icons in the upper right corner to change visible layers, view metadata, or create a custom printable map. Damage points and polygons are color-coded based on damage type: red for mortality, yellow for defoliation, and purple for abiotic/other damage. Each observation is superficially labeled with a shorthand code used by aerial surveyors. Select a polygon of interest to reveal a popup dialog box containing information on damage causal agent (i.e., DCA), host group, and percent-affected range.

For questions on how to use these interactive map products or any other related inquiries, please contact Isaac Davis listed in the Contacts section at the back of this report.



Example of the aerial detection survey layer in DNR's interactive map tool. Click on any polygon displayed to view the host tree(s) and disturbance agent attributed to the observation.

GIS DATA AVAILABLE FOR DOWNLOAD

1. ADS data from USFS archive, 1947–Present

The USFS hosts a long-term archive of aerial survey data for Washington and Oregon. These GIS files allow the user to visualize survey results for specific years of forest disturbance.

How to access:

- Go to the USFS Forest Health ADS page: <https://www.fs.usda.gov/r06/natural-resources/forest-health/aerial-detection-survey>
- On the page, find and click the “Aerial Detection Survey Data Download” link at the center of the page.
- Select a year of interest.
- A new page will open with a link to download a zipped geodatabase (.gdb) file.
- Inside the downloaded .gdb folder are shapefiles (.shp) you can open in GIS software. Common shapefiles include: damage polygons, damage points, and flightlines. USFS and DNR highly recommend that users also view the ‘areas not flown’ and ‘areas flown’ shapefiles when viewing presence/absence of damage polygons and points, especially when viewing 2025 data.

2. Washington DNR ADS Data, 1980–2025

DNR provides its own slimmed down version of aerial survey data from 1980 through 2025 called “Forest Health Aerial Survey All”.

How to access:

- Visit the Washington DNR GIS Open Data portal: <https://dnr.wa.gov/forest-resilience-digital-library>.
- Under the green “GIS Data and Mapping” heading, select “DNR Open GIS Forest Health Data.”
- In the search bar on the following page, type: “aerial survey”
- For the link titled “Forest Health Aerial Survey 1980-2024” (with newer years added as they’re published), the full dataset can be downloaded from the following webmap service in a variety of file formats.
- For individual years (e.g., Forest Health Aerial Survey 2024), select the layer, click the blue link titled “View Full Details,” and select the layers you would like to download. The option to download is located on the page following each link.

Using Downloaded ADS Data

Once .gdb or .shp files have been downloaded:

- Open the file using GIS software such as ArcGIS, QGIS, or similar programs.
- Visualize survey results – view patterns of mortality or defoliation by year.
- Compare historical trends or focus on specific disturbance events.

FOREST HEALTH WEBSITES

For supplemental information on forest health research, monitoring, prescribed fire, and technical assistance programs provided by the Forest Resilience Division, please visit: <http://www.dnr.wa.gov/ForestHealth>. Click the link titled “Insects and Disease Monitoring” under the “Assistance and Information” heading in the main body of the webpage to learn more about recent forest health monitoring efforts and reporting. Additional forest health resources can be found online in DNR’s Forest Resilience Library at <https://dnr.wa.gov/forest-resilience-digital-library>.

Updates to the DNR Insect and Disease Monitoring website are ongoing. New products and resources are in development. Visit <https://dnr.wa.gov/forest-resilience-division/insects-and-disease-monitoring> to find new tools and resources not listed here.



View from the ADS plane.

CREDIT: RACHEL BROOKS / DNR



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CREDIT: GLENN KOHLER / DNR



DNR and USFS staff
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